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REVISION OF *PARAPHRYNUS* MORENO

(AMBLYPYGIDA: PHRYNIDAE)

FOR NORTH AMERICA AND THE ANTILLES

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ABSTRACT: A previously proposed name, *Paraphrynus*, is adopted for *Hemiphrynus*, a generic name found to be preoccupied by its use in the Coleoptera. Study of *Paraphrynus* is limited to species occurring in the United States, the West Indies, Mexico, and Central America. Ten species have previously been referred to this genus; however two, *Hemiphrynus corderoi* Mello-Leitão and *Hemiphrynus machadoi* Fage, are believed to have been erroneously placed here. Of the eight remaining species, six are redescribed and illustrated (four from holotypes, one from a paratype, and one from topotypes). Those species not redescribed are *Paraphrynus fuscimanus* and *Paraphrynus intermedius*. *Paraphrynus fuscimanus* is regarded as a *nomen dubium*, hence the removal of *Paraphrynus mexicanus* as a synonym of this species. Seven new species are described. Three of these show characters unique within the genus. *Paraphrynus velmae* does not possess a median ocular tubercle nor a median pair of eyes. *Paraphrynus baeops* similarly has no median ocular tubercle, but does possess a pair of minute median eyes.

Paraphrynus astes possesses clavate setae, believed to be stridulatory in nature, on the inner lateral surface of the chelicerae.

INTRODUCTION

Amblypygids are non-venomous and non-silk spinning arachnids. Phylogenetically they, along with whip scorpions, are placed between scorpions and spiders, with closer affinities to the latter (Savory, 1964). They are somewhat crablike in appearance, with rather flat bodies, and can dart sideways with as much ease as they move forward. Body length may reach four cm. in some species. Their flat shapes and brownish coloration are indicative of cryptic lives that may be spent largely in caves, rock crevices, and under bark and logs. They are also reported to occupy houses in some areas of the world (Savory, 1964; Gravely, 1915). They are not known to dig burrows and are largely nocturnal in activity (Alexander, 1962).

The body of the amblypygid is divided into two parts, prosoma and abdomen (fig. 1). The prosoma is covered by a dorsal plate, the carapace. Anteriorly this carapace generally contains eight eyes in three groups. Two lateral groups consist of three eyes each while a middle group, usually situated on a median ocular tubercle, has only two. The abdomen is ovoid in shape and possesses no tail. There are four pairs of legs. However, unlike those of other arachnids, the tibiae and tarsi of the first pair are so modified that the legs are antenniform in appearance and have no resemblance to the other three pairs of walking legs. The antenniform legs are not used for walking but are sensory in function. With them the animal gently and carefully taps environmental surroundings as well as prey. Personal observations indicate that these antenniform legs, up to the femora, are easily lost without harm to the animal. After the next molt they are fully regenerated. Anterior to this pair of modified legs are the pedipalps. The inner lateral edges of the segments are supplied with sharp spines dorsally and ventrally. These spines indicate the predaceous nature of an animal whose prey is most likely various invertebrates. Prey capture is aided by these spines which are used for holding the prey or actually piercing it. The last segment of the pedipalp is the tarsus, a single claw-like segment. Not only is this tarsus used for prey capture but it is also supplied with cleaning hairs for use in grooming.

Amblypygids most commonly occur in the tropical and semitropical areas of the world. In the New World, they range from the southernmost parts of the United States to Brazil. The areas with which this paper is concerned are Central America, Mexico, the West Indies, and the United States. Three genera occur in these areas. *Acanthophrynus* is found in western Mexico while *Phrynus* and *Paraphrynus*

range from Central America into Florida, Texas, Arizona, and California.

Paraphrynus was previously known under the name *Hemiphrynus*. This latter name was originally proposed by Pocock (1902a) in a list of genera under the new family Phrynidae, with *Tarantula laevifrons* Pocock designated as type-species. However, no description of the genus was included. Later the same year, he published a generic description in *Biologia Centrali-Americana* (Pocock, 1902b). At that time he included in the genus six previously described species, the oldest being *Phrynus fuscimanus* Koch with *Phrynus mexicanus* Bilimek and four species described by Pocock constituting the remaining five. Earlier, in 1895, Kraepelin synonymized these five species with *Phrynus fuscimanus* (under the generic name *Neophrynus*). Pocock did not accept this synonymy and in *Biologia Centrali-Americana* he considered his four species valid. In addition he described a new species, *Hemiphrynus raptator*. Not having examined the types of *P. fuscimanus* or *P. mexicanus*, he left the latter in synonymy with the former, recognizing that any one of his own species might also be a synonym of *P. fuscimanus*. Pocock's arrangement has generally been accepted by later workers. In this paper as well, his species are considered valid. However, since the type of *P. fuscimanus* cannot be located, and the original description gives no clue to the species identity, this name is here considered a *nomen dubium*. As a result *P. mexicanus* is considered a valid species.

After Pocock's revision of *Hemiphrynus* in 1902, the next species added to the genus was *Hemiphrynus intermedius* from Cuba (Franganillo, 1926). In 1940, Moreno discovered that the generic name *Hemiphrynus* was preoccupied by its use in the order Coleoptera (Horn, 1889). He proposed the name *Paraphrynus* as a replacement. This name, having been overlooked by later workers, has not been used since it was proposed, but is the only valid and available name for the genus. After 1940 two additional species, *Hemiphrynus corderoi* Mello-Leitão and *Hemiphrynus machadoi* Fage, were described; however, their placement in this category is believed to be erroneous. In this present revision seven new species are added and the types of four of Pocock's species are redescribed. Since the type of *Paraphrynus azteca* Pocock seems to be lost, a paratype is described. In addition *Paraphrynus mexicanus* Bilimek is diagnosed from topotypes, as the type cannot be located.

MATERIALS AND METHODS

This study is based on external characters of preserved specimens, hence species criteria are strictly morphological. Names of pedipalp segments follow those used by Millot (1941), while use of family and generic names is according to Pocock's system of classification (1902a).

MEASUREMENTS (figure 2). Measurements were made as follows: Carapace - length along median plane and width at widest part. Lateral eye groups - between the closest eyes of each cluster. Abdomen - length measured from anterior edge of second sternum (i.e. genital operculum) to last segment (not including anal operculum). Body length - sum of median carapace length and length of abdomen. Pedipalp femur - length measured ventrally and width under third and fourth ventral spines. Pedipalp tibia - length measured dorsally and width under third and fourth dorsal spines with segment situated so that spines were parallel with the focal plane. Pedipalp basitarsus - length measured dorsally and width measured so that dorsal and ventral surfaces were parallel with focal plane. Spines - lengths measured along distal edges.

NUMBERING OF PEDIPALP SPINES. A shorthand notation is used to refer to certain spines. Each of these spines is given a Roman numeral preceded by an abbreviation which indicates on which segment and surface of the pedipalp the spine is located. The following is a key to the abbreviations used. The terms used in reference to the various surfaces of pedipalp segments are descriptive rather than morphological.

tr - trochanter, inner lateral surface
 Fd - femur, dorsal surface
 Fv - femur, ventral surface
 Td - tibia, dorsal surface
 Tv - tibia, ventral surface
 Bd - basitarsus, dorsal surface
 Bv - basitarsus, ventral surface

For example Fd-IV is spine IV on the dorsal surface of the femur of the pedipalp. Numbering of spines is shown in species illustrations.

Roman numerals have been assigned to spines felt to be most constant from one species to another and not necessarily according to length. If all spines are counted, the total number on a dorsal or ventral surface of a pedipalp segment may differ between individuals. This may be due to species differences or individual variation. Because of this variation, the actual fourth spine on a segment in one individual may not be homologous with the fourth spine on the same segment in another, but all specimens will normally have the same basic spines. With these given Roman numerals, it is easier to refer to the location of extras and to avoid confusion in reference to a particular spine.

Spines are numbered from proximal to distal end of each segment. Numbering is usually obvious but the following spines may cause confusion. *Femur, dorsal surface* (Fd): Between Fd-III and V there may be one or two spines, the longest, whether it be a mere spinule or very long, is Fd-IV. *Tibia, ventral surface* (Tv): Between II and IV there may be more than one spine, the longest is Tv-III.

Basitarsus: The basis for numbering is the same on the dorsal and ventral surfaces. II is always the longest spine on either surface. I is the longest spine proximal to II, and III is the longest spine distal to II. *Trochanter* (tr): In *Paraphrynus laevifrons* (Pocock), the additional spine on the inner lateral surface is tr-V.

RECORDS. Locality information not present on the original label is added in brackets.

Family PHRYNIDAE

The family Phrynidae is divided into two sub-families, the Phryninae and Heterophryninae. The ventral surface of the pedipalp trochanter in the Heterophryninae bears a sub-cylindrical sclerotized process projecting posteriorly, while this structure is lacking in the Phryninae (Pocock, 1902b). The genera of Phryninae can be identified by use of the following key.

KEY TO GENERA OF PHRYNINAE

1. Anterior edge of carapace serrate (fig. 3); proximal end of pedipalp femur with two spines on inner lateral surface, i.e. one dorsally between two longest proximal dorsal spines and one ventrally between first and second ventral spines (fig. 4) *Acanthophrynus*
Anterior edge of carapace smooth to denticulate (figs. 21, 23); spines on pedipalp femur all marginal, i.e. without spines projecting from inner lateral surface (fig. 5) 2
2. Anterodorsal margin of pedipalp tibia with one spine between the two longest spines (fig. 6) *Phrynus*
Anterodorsal margin with two spines (Td-IV and V) between the two longest, Td-V being the shortest (fig. 8b) *Paraphrynus*

Genus *PARAPHRYNUS* Moreno

- Phrynus* (in part); Koch, 1848, p. 67; Butler, 1873, p. 119.
Admetus Koch, 1850, p. 81 (in part).
Tarantula (in part); Pocock, 1893, p. 540; Pocock, 1894, pp. 279-282; Kraepelin, 1899, p. 243.
Neophrynus Kraepelin, 1895, p. 25 (in part).
Hemiphrynus Pocock, 1902a, p. 161 (original indication); Pocock, 1902b, p. 53 (description); Mello-Leitão, 1931, pp. 44-45.
Paraphrynus Moreno, 1940, pp. 167-168.

DIAGNOSIS. Color pale yellowish brown to almost black. Body length up to three cm. Dorsal spines of pedipalp tibia arranged along length of most of segment, not clustered distally as in some Old World genera. Pedipalp tibia with nine or ten (rarely more) dorsal spines; between the two longest (Td-III and VI) are two shorter spines (Td-IV and V) with IV longer than V. This pattern of spines distinguishes *Paraphrrynus* from the closely related *Phrrynus* which has only one spine between the two longest spines. Presently, this seems to be the only conspicuous and consistent difference between the two genera.

TYPE-SPECIES. *Tarantula laevifrons* Pocock by original designation.

DISTRIBUTION. Species of *Paraphrrynus* are known to occur in the southern parts of California, Arizona, and Florida. In Mexico they occur in Sonora and south into the states of Tamaulipas, San Luis Potosi, Vera Cruz, Guerrero, Puebla, Oaxaca, Chiapas, and the Yucatan peninsula. None are known to occur in the western states of Mexico nor in Baja California. *Paraphrrynus* also occurs in the West Indies and Central America, where the southernmost record is Panama, south of the Canal Zone. Since this study of *Paraphrrynus* is limited to specimens from these areas, the possibility of their occurrence in South America has not been verified.

TAXONOMIC CHARACTERS. The following characters are considered useful as species criteria within *Paraphrrynus*.

Chelicera. Consists of two segments with dentition of first or basal segment differing among some species. The anteroventral surface of this segment always has two rows of teeth; the inner row consists of three teeth and the outer 'row' generally of one. This one tooth is always located across from and between the double pointed and middle teeth of the inner row. A proximal ridge may connect this outer tooth with the inner double pointed tooth (figs. 15g, 19g). This ridge is raised to varying degrees so that it can be interpreted as a second tooth in some species (fig. 34g). In other species, e.g. *Paraphrrynus astes* and *P. viridiceps*, the outer row consists of three teeth, none of which are formed from the previously mentioned ridge but are located distal to it (figs. 22i, 24h). Other differences in the basal segment are the presence or absence of one or two well developed setiferous tubercles on the anterodorsal edge (fig. 12h) and the presence of clavate setae on the mesal surface in *P. astes* (fig. 22h) as opposed to the acuminate setae found in other species of *Paraphrrynus* (fig. 24g).

Gnathocoxa. Two characters are used for taxonomic purposes. The first involves coloration: characteristically the ventral surface is always brown with a white or unpigmented mesal surface. This mesal surface is supplied with very fine setae. Ventrally on this white area, there is a longitudinal row of fine setae extending from the endite to the base of the gnathocoxa. The white area extends beyond this longitudinal row onto the ventral surface. It is this

area of white ventrad to the row of setae that is of taxonomic significance. In most species of *Paraphrynus* this white area is narrow (figs. 32h, 34h), while in *P. mexicanus* it is broad (fig. 29d).

The other character concerns setae on the ventral pigmented surface. In *Paraphrynus poccocki* there is an elongate region devoid of conspicuous setae, basal to the endite and adjoining the inner white area (fig. 32h). In other species of *Paraphrynus* these setae extend to the white area (fig. 34h).

Pedipalp. Lengths of certain spines have proven useful as taxonomic characters. Some comparative lengths used in the species key to separate species groups are: Bd-I versus Bd-III, and Bd-I versus Bv-III. There also appears to be a pattern of comparative lengths of Td-II, V, and VII, with the pattern differing among species groups. Another significant character involves the presence or absence of a small inconspicuous spine situated proximally on the dorso-inner lateral surface of the pedipalp tarsus (fig. 17g). The presence of the spine is generally accompanied by a short Fv-III on the ventral surface of the femur, i.e. the difference in length between it and Fv-II is much greater than difference between Fv-II and I (fig. 17c). Species without the small spine (fig. 32f) generally have equal differences in lengths between Fv-I, II, and III (fig. 32c).

In some species the tarsus and post-tarsus are fused (fig. 32f) whereas in others a suture separates these two areas (fig. 26g).

Legs. One character used involves the tarsus of the walking leg. The second tarsomere may contain a light transverse line distally which resembles a suture. The line more or less extends the width of the segment (figs. 29b, 31c). It is present in most species, but absent in *P. laevifrons* and two forms of *P. mexicanus* (fig. 29c) and is felt to be significant if accompanied by other differences.

Eyes. Characters used are: presence or absence of median ocular tubercle and its eyes; size of median ocular tubercle and distance of tubercle from anterior edge of carapace.

KEY TO SPECIES OF PARAPHRYNUS

- 1. Bd-I shorter than Bd-III (figs. 19e, 22e, 24e); pedipalp trochanter with four or five spines, the fifth one being in center of inner lateral surface (fig. 19f)..... 7
- Bd-I longer than Bd-III (figs. 8f, 10e, 12e, 15e, 26e, 29e); trochanter of pedipalps armed with four spines only, a setiferous tubercle may replace fifth spine (figs. 8e, 10g, 12f, 15h, 17f, 32i, 34f)..... 2

2. Fv-I, II, and III without even diminution in length, difference between lengths of Fv-I and II conspicuously less than difference between Fv-II and III (figs. 8c, 10c, 12c, 15c, 17c); proximal end of dorso-inner lateral surface of pedipalp tarsus with small inconspicuous spine (figs. 8h, 10e, 12g, 15c, 17g)..... 3
 Fv-I, II, and III with even diminution in length, difference between lengths of Fv-I and II appearing about equal to difference between Fv-II and III (figs. 26c, 28c, 29h, 32c, 34c); proximal end of dorso-inner lateral surface of pedipalp tarsus without small spine (figs. 26g, 28g, 32f, 34e)..... 9
3. Pedipalp tarsus and post-tarsus appearing fused from dorsal and ventral surfaces, no apparent suture separating these two areas (fig. 8h) *Paraphrynus raptator* (Pocock)
 Pedipalp tarsus and post-tarsus not completely fused, an apparent suture being visible dorsally and ventrally (figs. 10e, 12g, 15f, 17g)..... 4
4. Inner lateral surface of pedipalp basitarsus appearing rough with coarse and fine granules (figs. 15e, 17e); Bd-III shorter than Td-IX (figs. 15b, e, 17b, e)..... 6
 Inner lateral surface of pedipalp basitarsus smooth with only a few marginal coarse granules (figs. 10e, 12e); Bd-III as long as Td-IX (figs. 10b, e, 12b, e)..... 5
5. Median ocular tubercle prominent (height 0.5 mm.) (fig. 10f) and its distance from anterior edge of carapace much less than one half its longitudinal diameter (fig. 9); color dark brown *Paraphrynus macrops* (Pocock)
 Median ocular tubercle less prominent (height 0.25 mm.) and its distance from anterior edge of carapace about equal to half its longitudinal diameter (fig. 11a); color pale brown
 *Paraphrynus williamsi* Mullinex, new species
6. Legs and pedipalps abnormally long (fig. 13) with pedipalp tibia at least eight times longer than wide (fig. 15b); length of pedipalp femur greater than width of carapace; Td-II and III separated by a distance at least twice the basal width of Td-III (fig. 15b)
 *Paraphrynus emaciatatus* Mullinex, new species

- Legs and pedipalps not abnormally long with pedipalp tibia less than eight times longer than wide (fig. 17b); length of pedipalp femur less than width of carapace; Td-II separated from Td-III by a distance about equal to width of base of Td-III (fig. 17b).....
 *Paraphrynus leptus* Mullinex, new species
7. Inner lateral surface of pedipalp trochanter with fifth spine in middle (fig. 19f); Bv-III longer than Bv-I and Bd-I (fig. 19e); outer edge of anteroventral surface of basal cheliceral segment with one or two teeth (fig. 19g).....
 *Paraphrynus laevifrons* (Pocock)
- Inner lateral surface of pedipalp trochanter without fifth spine or with at most a small setiferous tubercle (figs. 22f, 24f); Bv-III minute, smaller than Bv-I and Bd-I (figs. 22e, 24e); outer edge of anteroventral surface of basal cheliceral segment with three teeth (figs. 22i, 24h)..... 8
8. Inner lateral surface of basal cheliceral segment with clavate setae (fig. 22h); pedipalp tarsus and post-tarsus not completely fused, a suture on inner lateral surface only (fig. 22e), not on outer lateral or on dorsal and ventral surfaces (fig. 22g).....
 *Paraphrynus astes* Mullinex, new species
- Inner lateral surface of basal cheliceral segment with acuminate setae (fig. 24g); pedipalp tarsus and post-tarsus completely fused, no inner lateral suture (fig. 24e)..
 *Paraphrynus viridiceps* (Pocock)
9. Carapace lacking median ocular tubercle and median pair of eyes (fig. 25).....
 *Paraphrynus velmae* Mullinex, new species
- Carapace with (fig. 31a) or without (fig. 27) median ocular tubercle; median pair of eyes always present though possibly reduced in size (fig. 25)..... 10
10. Two median eyes situated on blackish median ocular tubercle (fig. 31)..... 11
- No median ocular tubercle; two median eyes minute and median ocular area concolorous with carapace (fig. 27).....
 *Paraphrynus baeops* Mullinex, new species

- 11. Ventral surface of gnathocoxa with broad area of white ventrad to the longitudinal row of hairs located on white mesal surface (fig. 29d); second tarsomere with or without thin light transverse line (fig. 29b, c)..... *Paraphrrynus mexicanus* (Bilimek)
 Ventral surface of gnathocoxa with narrow area of white ventrad to the longitudinal row of hairs (figs. 32h, 34h); second tarsomere always with thin light transverse line (fig. 3lc)..... 12

- 12. Anteroventral surface of basal cheliceral segment with one tooth on outer edge (fig. 32g); ventral pigmented area of gnathocoxa with an elongate region devoid of conspicuous setae located basal to endite and adjoining inner white area (fig. 32h).....
 *Paraphrrynus pococki* Mullinex, new species
 Anteroventral surface of basal cheliceral segment with two teeth on outer edge (fig. 34g); ventral pigmented area of gnathocoxa with setae extending to edge of white area (fig. 34h).....
 *Paraphrrynus azteca* (Pocock)

Paraphrrynus raptator (Pocock), new combination.
(Figures 7, 8a-h.)

Hemiphrrynus raptator Pocock, 1902, p. 54.
Tarantula fuscimanus; Muma, 1967, p. 23.

DIAGNOSIS. A large species (length of holotype 29 mm.); color in alcohol dark reddish brown. Bd-I longer than Bd-III (fig. 8f). Difference in length between first and second ventral spines of pedipalp femur conspicuously less than difference in length between second and third spines; i.e., these first three spines do not appear to diminish evenly in length. Fv-III about same length as Fv-V (fig. 8c). Dorso-inner lateral surface of proximal end of pedipalp tarsus with a small spine (fig. 8h). Pedipalp tarsus and post-tarsus fused, no suture separating these two areas (fig. 8h), thus differing from its closest relative *Paraphrrynus macrops*, whose pedipalp tarsus and post-tarsus are separated by a suture (fig. 10). Also differs in size of median ocular tubercle and its distance from anterior edge of carapace. *Paraphrrynus raptator* with much smaller and less prominent tubercle whose distance from anterior edge of carapace is greater than half the length of the tubercle (fig. 7). *Paraphrrynus macrops* with very large prominent tubercle situated very close to anterior edge of carapace (fig. 9).

REDESCRIPTION OF HOLOTYPE (Male). CARAPACE. Anterior edge slightly bilobed. Distance of median ocular tubercle from anterior edge greater than half length of tubercle. Color of carapace dark reddish brown. Measurements. Length 9.5 mm., width 15.0 mm., sulcus from anterior edge 6.0 mm. *Median ocular tubercle:* length 0.8 mm., width 0.8 mm., from anterior edge 0.5 mm. *Lateral eyes:* from each other 4.3 mm., from lateral edge 2.0 mm., from anterior edge 1.7 mm.

CHELICERAE. Anterodorsal surface of basal segment with well developed tubercle on outer edge and smaller one on inner edge. Anteroventral surface of basal segment with one tooth on outer edge (fig. 8g).

PEDIPALPS. Color dark brown as in carapace. *Trochanter* with four spines and a prominent setiferous tubercle on inner lateral surface (corresponds to tr-V in *Paraphrynus laevifrons*); tr-III slightly less than half the length of tr-IV. *Femur* with Fd-IV well developed, more or less the same length as Fd-VI and greater than half the length of Fd-V; ventrally, first three spines not diminishing evenly in length, difference between lengths of Fv-I and II conspicuously less than difference between lengths of Fv-II and III; Fv-III and V about equal in length; Fv-IV slightly shorter than Fv-VI and about half the length of Fv-V. *Tibia* with Td-II longer than Td-V and VII, which are about equal in length; Td-V and VII less than half the length of Td-VI; Td-V about half the length of Td-IV and less than twice the length of Td-I; Td-VIII just slightly shorter than Td-VII; ventrally, Tv-I and IV essentially equal in length with Tv-I at most only slightly longer. *Basitarsus* with Bd-I longer than Bd-III; Bd-III much longer than twice the length of the spinule proximal to it and longer than spine IX on dorsal surface of tibia. *Tarsus* with dorso-inner lateral surface with a small inconspicuous spine located proximally; tarsus and post-tarsus fused, no suture separating these two areas. Measurements. *Femur:* length 13.0 mm., width 2.0 mm. *Tibia:* length 13.0 mm., width 2.5 mm., length of longest dorsal spine (Td-III) 4.0 mm. *Basitarsus:* length 5.5 mm., width 1.7 mm. *Tarsus:* length 5.2 mm.

LEGS. Uniform reddish brown with no conspicuous banding. Somewhat lighter than pedipalps and carapace and about same color as abdomen. Distal end of second tarsomere with light transverse line. Measurements. *Antenniform leg:* (femur) 34.0 mm. *Leg II:* (femur) 22.5 mm., (tibia) 24.0 mm., (basitarsus) 10.0 mm., (tarsus) first segment 2.0 mm., second segment 1.0 mm., fourth segment 1.5 mm. *Leg III:* (femur) 24.0 mm., (tibia) 27.0 mm., (basitarsus) 11.0 mm., (tarsus) first segment 2.2 mm., second segment 1.0 mm., fourth segment 1.5 mm. *Leg IV:* (femur) 21.0 mm., (tibia) first segment 17.0 mm., second segment 3.0 mm., third segment 6.7 mm., (basitarsus) 10.0 mm., (tarsus) first segment 2.2 mm., second segment 1.0 mm., fourth segment 1.5 mm.

ABDOMEN. Color of dorsal surface reddish brown with lighter areas around muscular impressions. Measurements. Length 19.0 mm., width 10.0 mm. *Genital operculum:* length 3.7 mm., width 7.0 mm.

TYPE DATA. Holotype: male, collected in Teapa, Tabasco, Mexico, by H. H. Smith. No date given. Deposited in the British Museum (Natural History).

DISTRIBUTION. (Figure 35). Records of occurrence in Northern Honduras; Yucatan Peninsula to Tabasco, Mexico; and in Florida Keys, U.S.A.

FORMS. Specimens from Florida and Honduras most closely resemble the holotype, However, the Yucatan, Quintana Roo, and Campeche specimens differ in the following ways: anterodorsal surface of basal cheliceral segment without prominent setiferous tubercles, or with at most only a slightly developed outer one (smaller than setiferous tubercle in center of inner lateral surface of trochanter), while holotype has two well developed tubercles on anterodorsal surface. Bd-III slightly longer than in holotype, and spinule proximal to Bd-III considerably greater than twice the length of the spinules before it. Tr-III noticeably greater than half the length of tr-IV, whereas in the type tr-III is less than half the length of IV. Fd-IV less than half the length of Fd-V, while in holotype it is longer. Tv-I slightly shorter than Tv-III and slightly longer in type. Color pale to medium brown, not at all dark as in type. The specimen from Tabasco has the cheliceral tubercles on anterodorsal surface better developed than Yucatan specimens and has banding on the legs.

RECORDS. UNITED STATES. *Florida*: Monroe County, Key West, outside privy, 3 March 1961, W. W. Warner, 1 male (FDA); Key West, 9 August 1962, F. Gonzalez, 1 male (FDA); Key West, 15 August 1952, W. W. Warner, 1 male (FDA). MEXICO. *Quintana Roo*: Esperanza, 38 mi. SE. Chemax, 16 November 1965, J. G. Edwards, 2 females, 1 male (REM); Tanchah, Cave Rouel, 21 December 1966, R. E. Main, 3 males (REM); Tanchah, unnamed cave near Cenote, 20 December 1966, R. E. Main, 3 males (REM). *Yucatan*: Peto, March 1967, A. D. Covitch, 1 male (BRV); Colonia Yucatan, 18 August 1964, Pallister, 1 male, 1 female (AMNH); Chichen Itza, 16 July 1952, J. and D. Pallister, 1 female (AMNH); Chichen Itza, 1903, E. K. Thompson and L. J. Cole, 1 female (MCZ); Chichen, 1 February 1930, 1 male, 1 female (MCZ). *Campeche*: Campeche, November 1944, M. Guerra, 1 female (AMNH). *Tabasco*: Boca del Cerro, March 1945, M. Guerra, 1 male (AMNH). HONDURAS. La Lima and San Pedro, 4 January 1937, W. Baerg, 1 female (SCW); Utila Island, Brandon Hill, 30 August 1972, L. Hallacher and K. McKaye, 1 male (CLM).

Paraphrynus macrops (Pocock), new combination.
(Figures 9, 10a-g.)

Tarantula macrops Pocock, 1894, pp. 281-282.

Neophrynus fuscimanus (in part); Kraepelin, 1895, p. 25.

DIAGNOSIS. Medium sized species (length of holotype 20.0 mm.); color in alcohol dark reddish brown. Similar to

P. raptator, *P. williamsi*, *P. leptus*, and *P. emaciatus* in the following ways: Bd-I longer than Bd-III (fig. 10); difference in length between first and second ventral spines of pedipalp femur conspicuously less than difference in length between second and third spines, so that these first three spines do not appear to have an even diminution in length; third spine about same length as Fv-V (fig. 10c). Td-II longer than Td-VII (fig. 10b); proximal end of dorso-inner lateral surface of pedipalp tarsus with a small spine (fig. 10e); pedipalp trochanter with four spines and a prominent setiferous tubercle on its inner lateral surface that may be interpreted as a fifth spine (fig. 10g).

Paraphrynus macrops, *P. williamsi*, *P. leptus*, and *P. emaciatus* differ from *P. raptator* in that their pedipalp tarsi are not fused, that is, a suture can be seen dorsally and ventrally (figs. 12g, 15f, 17g). In *P. raptator* the tarsus and post-tarsus are fused and lack any trace of a suture (fig. 8h). *Paraphrynus macrops* and *P. williamsi* can be distinguished from *P. leptus* and *P. emaciatus* in the following ways: The former two species have the inner lateral surface of pedipalp basitarsus smooth in appearance (figs. 10e, 12e); *P. leptus* and *P. emaciatus* have this surface rough because of numerous coarse and fine granules (figs. 15e, 17e); *P. macrops* and *P. williamsi* with Bd-III as long as and generally longer than Td-IX (figs. 10b, e, 12b, e); *P. leptus* and *P. emaciatus* with Bd-III shorter (figs. 15b, e, 17b, e). Closest relative of *P. macrops* appears to be *P. williamsi*. The former, however, has a larger and more prominent median ocular tubercle (figs. 9, 10f) and possesses fewer secondary spines on dorsal and ventral surfaces of pedipalp femur (fig. 10a, c). *Paraphrynus williamsi*, in contrast, has a smaller tubercle and possesses more of these secondary spines (fig. 12a, c). *Paraphrynus macrops* is also much darker than the pale *P. williamsi*.

REDESCRIPTION OF HOLOTYPE (Female). CARAPACE. Color dark reddish brown. Anterior edge straight. Distance of median ocular tubercle from anterior edge equal to less than half of length of tubercle. Tubercle prominent, 0.5 mm. high. Measurements. Length 7.0 mm., width 10.7 mm., sulcus from anterior edge 4.5 mm. *Median ocular tubercle:* length 0.7 mm., width 0.9 mm., from anterior edge 0.2 mm. *Lateral eyes:* from each other 3.2 mm., from lateral edge 1.2 mm., from anterior edge 1.2 mm.

CHELICERAE. Anterodorsal surface of basal segment with well developed tubercle on outer edge and smaller one on inner edge. Anteroventral surface of basal segment with one tooth on outer edge.

PEDIPALPS. *Trochanter* with four spines and a prominent setiferous tubercle in middle of inner lateral surface. *Femur* with Fd-IV slightly longer than Fd-VI and greater than half the length of Fd-V; ventrally with first three spines not diminishing evenly in length, difference between lengths of Fv-I and II conspicuously less than difference between lengths of Fv-II and III; Fv-III and V more or less equal in

length; Fv-IV slightly shorter than Fv-VI and about half the length or less of Fv-V. *Tibia* with Td-I considerably longer than half the length of Td-V; Td-IV twice the length of Td-V; Td-V and VII about equal in length and shorter than Td-II; Td-VII less than half the length of Td-VI; ventrally with Tv-I slightly shorter than Tv-IV, and Tv-II and V about equal in length. *Basitarsus* with Bd-I longer than Bd-III; Bd-III much longer than twice the length of the spinule proximal to it and longer than spine IX on the dorsal surface of the tibia. *Tarsus* with proximal dorso-inner lateral surface with a small inconspicuous spine; tarsus and post-tarsus not fused dorsally and ventrally; i.e. a suture separates these two areas although it is absent on the outer lateral surface. Measurements. *Femur*: length 7.3 mm., width 1.5 mm. *Tibia*: length 7.5 mm., width 1.8 mm., length of longest dorsal spine (Td-III) 2.8 mm. *Basitarsus*: length 3.8 mm., width 1.3 mm. *Tarsus*: length 4.0 mm.

LEGS. Somewhat discolored but appear uniform medium brown, without banding. Second tarsomere of all tarsi with light transverse line near distal end. Measurements. *Antenniform leg*: femur broken off. *Leg II*: (femur) 16.0 mm., (tibia) 16.5 mm., (basitarsus) 7.8 mm., (tarsus) first segment 1.5 mm., second segment 0.8 mm., fourth segment 1.3 mm. *Leg III*: (femur) 18.0 mm., tibiae, basitarsi, and tarsi broken off. *Leg IV*: (femur) 15.0 mm., (tibia) first segment 11.0 mm., second segment 2.3 mm., third segment 5.0 mm., (basitarsus) 7.5 mm., tarsi broken off.

ABDOMEN. Measurements. Length 13.0 mm. *Genital operculum*: length 2.5 mm., width 5.0 mm.

TYPE DATA. Holotype: female from South America. Depository is the British Museum (Natural History).

REMARKS. This species is known only from the holotype. It appears to be most closely related to the Guatemalan species, *P. leptus* and *P. emaciatus*.

Paraphrynus williamsi Mullinex, new species.
(Figures 11a-b, 12a-h.)

DIAGNOSIS. Medium sized species (length of holotype 20 mm.); color in alcohol pale brown. Resembles *P. macrops*, *P. leptus*, and *P. emaciatus* in the following ways: Bd-I longer than Bd-III (fig. 12e); difference in length between first and second ventral spines of pedipalp femur considerably less than difference in length between second and third spines, so that these first three spines do not appear to diminish evenly in length (fig. 12c); dorso-inner lateral surface of proximal end of pedipalp tarsus with a small inconspicuous spine (fig. 12g); pedipalp tarsus and post-tarsus not fused; i.e. these two areas are separated by a suture (fig. 12g). Can be distinguished from *P. leptus* and *P. emaciatus* in the following ways: *P. williamsi* with Bd-III longer than spine IX on dorsal surface of tibia (fig. 12b, e); inner lateral surface of pedipalp basitarsus smooth with

only a few marginal coarse granules (fig. 12e). *Paraphrynus leptus* and *P. emaciatus* with Bd-III shorter than spine IX on dorsal surface of tibia (figs. 15b, e, 17b, e), and with inner lateral surface of pedipalp basitarsus appearing rougher because of numerous fine and coarse granules (figs. 15e, 17e). Closest relative of *P. williamsi* is *P. macrops*. These two can be distinguished in the following ways: *P. williamsi* is pale brown with smaller secondary spines between the longer spines of the pedipalp femur (fig. 12c) and with distance of median ocular tubercle from anterior edge equal to slightly less than its longitudinal diameter (fig. 11a). *Paraphrynus macrops* is dark brown, with fewer secondary spines on the pedipalp femur (fig. 10c) and with median ocular tubercle on edge of carapace and more prominent (fig. 9).

DESCRIPTION OF HOLOTYPE (Female). CARAPACE. Pale yellow-brown in color. Anterior edge straight. Distance of median ocular tubercle from anterior edge equal to slightly less than length of tubercle. Tubercle 0.3 mm. high. Measurements. Length 7.8 mm., width 11.5 mm., sulcus from anterior edge 4.8 mm. *Median ocular tubercle:* length 0.5 mm., width 0.8 mm., distance from anterior edge 0.4 mm. *Lateral eyes:* from each other 3.8 mm., from lateral edge 1.8 mm., from anterior edge 1.3 mm.

CHELICERAE. Anterodorsal surface of fixed segment with a setiferous tubercle on outer edge and a smaller one on inner edge. Anteroventral surface of basal segment with one tooth on outer edge.

PEDIPALPS. *Trochanter* with four spines and a prominent setiferous tubercle on its inner lateral surface; tr-I longer than tr-IV. *Femur* with Fd-IV longer than Fd-VI and greater than half the length of Fd-III; ventrally, first three spines not diminishing evenly in length, i.e. difference between lengths of Fv-I and II conspicuously less than difference between lengths of Fv-II and III; Fv-III longer than Fv-V (in paratypes it is slightly shorter than Fv-V); Fv-IV slightly shorter than Fv-V and VI which are about equal in length. *Tibia* with Td-I less than half the length of Td-V; Td-II longer than V and VII which are about equal in length; Td-V noticeably greater than half the length of Td-IV (in paratypes Td-V is only slightly greater than half the length of Td-IV); ventrally, Tv-I slightly shorter than Tv-IV; Tv-III about half the length of Tv-IV and intermediate in length between that of Tv-VI and VII. *Basitarsus* with Bd-I longer than Bd-III; Bd-III much longer than twice the length of the spinule proximal to it and as long as spine IX on the dorsal surface of the tibia; inner lateral surface of basitarsus smooth with only a few marginal coarse granules. *Tarsus* with proximal end of dorso-inner lateral surface with small inconspicuous spine; tarsus and post-tarsus not fused, i.e. a suture separating these two areas. Measurements. *Femur:* length 8.5 mm., width 1.8 mm. *Tibia:* length 9.0 mm., width 1.8 mm., length of longest dorsal spine (Td-III) 3.3 mm. *Basitarsus:* length 4.5 mm., width

1.5 mm. *Tarsus*: length 5.0 mm.

LEGS. Uniform yellow-brown and lighter than pedipalps. Femur of antenniform leg same color as second, third, and fourth femora. Tarsi with light transverse line on second tarsomere. Measurements. *Antenniform leg*: (femur) 29.5 mm. *Leg II*: (femur) 17.5 mm., (tibia) 18.5 mm., (basitarsus) 9.3 mm., (tarsus) first segment 1.8 mm., second segment 0.8 mm., fourth segment 1.3 mm. *Leg III*: (femur) 19.3 mm., (tibia) 22.3 mm., (basitarsus) 10.0 mm., (tarsus) first segment 1.9 mm., second segment 0.8 mm., fourth segment 1.3 mm. *Leg IV*: (femur) 17.0 mm., (tibia) first segment 13.3 mm., second segment 2.0 mm., third segment 5.8 mm., (basitarsus) 9.3 mm., (tarsus) first segment 2.0 mm., second segment 0.8 mm., fourth segment 1.3 mm.

ABDOMEN. Dorsal surface approximately same color as legs with lighter areas around muscular impressions. Measurements. Length 12.0 mm. *Genital operculum*: length 2.8 mm., width 5.3 mm. Genitalia of female paratype as illustrated (fig. 11b).

TYPE DATA. Holotype: female from Grutas de Zapaluta, 4 mi. SE. Zapaluta, Chiapas, Mexico, 20 August 1967, J. Reddell, J. Fish, and T. Evans. Deposited in the American Museum of Natural History.

There are five paratypes, 3 females and 2 males. Both males appear to be immature. Three paratypes (2 females, 1 male) have the same data as holotype while two paratypes (1 female, 1 male) are from Cave of Zapaluta, Chiapas, Mexico, 19 July 1950, C. and M. Goodnight. One female paratype is deposited in the California Academy of Sciences, and the remainder in the American Museum of Natural History.

DISTRIBUTION. (Figure 35). This species is known only from the area of Zapaluta (now La Trinitaria) in Chiapas, Mexico.

REMARKS. The species is named for Dr. Stanley C. Williams.

Paraphrynus emaciatus Mullinex, new species.
(Figures 13, 14, 15a-h.)

DIAGNOSIS. Large species (holotype measures 30 mm. long) with slender appendages; color in alcohol pale red-brown. Bd-I longer than Bd-III (fig. 15e). Difference in length between first and second ventral spines of pedipalp femur conspicuously less than difference in length between second and third spines, so that these first three spines do not diminish evenly in length (fig. 15c). Dorso-inner lateral surface of proximal end of pedipalp tarsus with small tooth (fig. 15f). Pedipalp tarsus and post-tarsus not fused, a suture separating these two areas (fig. 15f). This latter character associates this species most closely with *P. macrops*, *P. williamsi*, and *P. leptus*, the only other described species of *Paraphrynus* with this suture. Can be most easily distinguished from *P. macrops* and *P. williamsi* by the following characters: *P. macrops* and *P. williamsi* with

Bd-III about the same length or longer than spine IX on the dorsal surface of the pedipalp tibia (figs. 10b, e, 12b, e); inner lateral surface of pedipalp basitarsus appearing smooth with only a few coarse granules but no fine granules (figs. 10e, 12e). In contrast, *P. emaciatus* and *P. leptus* have Bd-III very small, shorter than spine IX on the dorsal surface of the pedipalp tibia (figs. 15b, e, 17b, e), and with inner lateral surface of pedipalp basitarsus appearing rough with coarse granules and many fine granules (figs. 15e, 17e). *Paraphrynus emaciatus* is unique and most easily distinguished from all three species by its larger size and extremely long thin pedipalps and legs (fig. 13). The pedipalp femur is longer than the width of the carapace, and the pedipalp tibia is ten times as long as wide. In contrast, its closest relative, *P. leptus*, has shorter pedipalps, in which the length of the femur is less than the width of the carapace, and the length of the pedipalp tibia is six times the width. In *P. macrops* and *P. williamsi*, these ratios are even less.

DESCRIPTION OF HOLOTYPE. (Male). CARAPACE. Color medium to pale reddish brown and darker than abdomen. Anterior edge straight. Distance of median ocular tubercle from anterior edge equal to about half the length of the tubercle. Measurements. Length 10.0 mm., width 14.5 mm., sulcus from anterior edge 6.5 mm. *Median ocular tubercle:* length 0.7 mm., width 1.0 mm., from anterior edge 0.3 mm. *Lateral eyes:* from each other 5.0 mm., from lateral edge 2.0 mm., from anterior edge 1.5 mm.

CHELICERAE. Dorsal surface of basal segment without conspicuous setiferous tubercles on anterior edge. Antero-ventral surface of basal segment with one tooth on outer edge.

PEDIPALPS. Color reddish brown as in carapace. Unique among all other described *Paraphrynus* in that the pedipalps are extremely long and thin with femur being longer than width of carapace and tibia 10 times longer than wide. *Trochanter* with four spines on inner lateral surface and a well developed setiferous tubercle in center, its length is about half that of tr-III. *Femur* with Fd-IV same length or slightly longer than Fd-VI, and greater than half the length of Fd-III and V; ventrally, difference between lengths of Fv-I and II conspicuously less than difference between lengths of Fv-II and III; Fv-III about same length or slightly longer than Fv-V; Fv-IV greater than half the length of Fv-VI. *Tibia* with Td-V and VII about equal in length and shorter than Td-II; Td-V about half the length of Td-VI; Td-IV almost twice the length of Td-I; ventrally, Tv-I and IV about equal in length; Tv-III about one-third the length of Tv-I. *Basitarsus* with Bd-I longer than Bd-III and almost the same length as Bd-II, i.e., greater than three-fourths its length; Bd-III a minute spine, smaller than spine IX on dorsal surface of tibia; inner lateral surface rough with coarse and fine granules. *Tarsus* with proximal end of dorso-inner lateral surface with small

inconspicuous spine. Tarsus and post-tarsus not fused being separated by a suture. Measurements. *Femur*: length 18.5 mm., width 2.0 mm. *Tibia*: length 20.0 mm., width 2.0 mm., length of longest dorsal spine (Td-III) 5.8 mm. *Basitarsus*: length 7.5 mm., width 1.8 mm. *Tarsus*: length 7.0 mm.

LEGS. Yellow-brown in color and lighter than pedipalps. Femur of antenniform leg almost four times longer than width of carapace. Legs extremely long. Second, third, and fourth tibiae longer than their respective femora by 2 mm., 8 mm., and 10 mm. Second tarsomere of all tarsi with a light transverse line on distal end. Measurements. *Antenniform leg*: (femur) 54.0 mm. *Leg II*: (femur) 33.0 mm., (tibia) 35.5 mm., (basitarsus) 15.5 mm., (tarsus) first segment 2.3 mm., second segment 1.1 mm., fourth segment 1.8 mm. *Leg III*: (femur) 34.0 mm., (tibia) 41.0 mm., (basitarsus) 17.3 mm., (tarsus) first segment 2.5 mm., second segment 1.3 mm., fourth segment 1.9 mm. *Leg IV*: (femur) 31.0 mm., (tibia) first segment 23.0 mm., second segment 5.5 mm., third segment 12.3 mm., (basitarsus) 15.3 mm., (tarsus) first segment 2.8 mm., second segment 1.3 mm., fourth segment 2.0 mm.

ABDOMEN. Dorsal surface pale yellow-brown and lighter than legs with lighter areas around muscular impressions. Measurements. Length 19.8 mm. *Genital operculum*: length 4.3 mm., width 6.8 mm.

TYPE DATA. Holotype: male, collected in Guatemala, cemetery cave, Lanquin, Alta Verapaz, elevation 1022 feet, Brother N. Sullivan. No date given. Depository is the American Museum of Natural History.

DISTRIBUTION. (Figure 35). Known only from the type-locality.

REMARKS. The species is named for its extremely thin appearance. Females of this species are not known.

Paraphrynus leptus Mullinex, new species.
(Figures 16a-b, 17a-g.)

DIAGNOSIS. A medium sized species (length of holotype 20 mm.) with slender pedipalps; color in alcohol dark brown. Bd-I longer than Bd-III (fig. 17e). Difference in length between first and second ventral spines of pedipalp femur considerably less than difference in length between second and third spines, so that these first three spines do not diminish evenly in length (fig. 17c). Proximally, dorso-inner lateral surface of pedipalp tarsus with a small inconspicuous spine (fig. 17g). Pedipalp tarsus and post-tarsus not fused, a suture separating these two areas (fig. 17g). This latter character associates this species most closely with *P. macrops*, *P. williamsi*, and *P. emaciatu*s. *Paraphrynus leptus* and *P. macrops* have a similar dark brown color, while *P. williamsi* and *P. emaciatu*s are considerably paler. *Paraphrynus leptus* is most easily distinguished from *P. macrops* and *P. williamsi* by the following characters:

the latter two species with Bd-III same length or longer than spine IX on dorsal surface of tibia (figs. 10b, e, 12b, e); inner lateral surface of basitarsus appearing smooth with only a few coarse granules but no fine granules (figs. 10e, 12e). In contrast, *P. leptus* and *P. emaciatus* have Bd-III as a minute spine, much shorter than spine IX on the dorsal surface of the pedipalp tibia (figs. 15b, e, 17b, e) and have the inner lateral surface of pedipalp basitarsus rough with coarse and fine granules (figs. 15e, 17e).

Paraphrynus leptus is distinguished from *P. emaciatus* by its color and the length of the pedipalps. The former is dark brown with thin pedipalps about six times longer than wide. Their lengths, however, are normal, with the length of pedipalp femur and tibia not exceeding the width of carapace. In contrast, *P. emaciatus* is pale brown with abnormally long, thin pedipalps, so that the length of the pedipalp femur is greater than the width of the carapace by about 4 mm. and length of pedipalp tibia exceeds width of carapace by about 6 mm.

DESCRIPTION OF HOLOTYPE (Male). CARAPACE. Anterior edge straight. Color dark reddish brown. Median ocular tubercle large and prominent and very close to anterior edge of carapace; i.e., much closer than half its longitudinal diameter. Measurements. Length 7.5 mm., width 11.5 mm., sulcus from anterior edge 4.5 mm. *Median ocular tubercle*: length 0.8 mm., width 1.0 mm., from anterior edge 0.2 mm. *Lateral eyes*: from each other 3.5 mm., from lateral edge 1.5 mm., from anterior edge 1.3 mm.

CHELICERAE. Anterodorsal surface of basal segment without prominent tubercles. Anteroventral surface of basal segment with one tooth on outer edge.

PEDIPALPS. Color same as carapace. *Trochanter* with four spines on inner lateral surface and a tubercle in center whose length is much less than half the length of tr-III. *Femur* with Fd-IV shorter than Fd-VI and less than half the length of Fd-V; ventrally, difference between lengths of Fv-I and II conspicuously less than difference between Fv-II and III; Fv-III slightly shorter than Fv-V; Fv-IV considerably less than half the length of Fv-VI. *Tibia* with Td-II longer than Td-V and VII which are about equal in length; these latter two spines considerably less than half the length of Td-VI; Td-V about half the length of Td-IV; Td-I intermediate in length between Td-VII and VIII; Td-VII, VIII, and IX diminishing evenly in length; i.e., difference between lengths of Td-VII and VIII not greater than difference between Td-VIII and IX; ventrally, Tv-I and IV about equal in length; Tv-III about one third the length of Tv-I. *Basitarsus* with Bd-I longer than Bd-III and greater than half the length of Bd-II; Bd-III shorter than spine IX on dorsal surface of tibia; inner lateral surface of basitarsus rough with coarse and fine granules. *Tarsus* with small inconspicuous spine on dorso-inner lateral surface of proximal end; tarsus and post-tarsus not fused, a suture separating the two areas. Measurements. *Femur*:

length 8.8 mm., width 1.5 mm. *Tibia*: length 9.3 mm., width 1.5 mm., length of longest dorsal spine (Td-III) 2.8 mm. *Basitarsus*: length 4.0 mm., width 1.3 mm. *Tarsus*: length 3.5 mm.

LEGS. Yellow-brown; femora with spots of lighter color. Second tarsomere of all tarsi with light transverse line on distal end of segment. Measurements. *Antenniform leg*: (femur) 25.0 mm. *Leg II*: (femur) 17.0 mm. *Leg III*: (femur) 17.5 mm. *Leg IV*: (femur) 15.5 mm. Tibiae and tarsi of legs broken off.

ABDOMEN. Color yellow-brown with a darker stripe down middle and lighter areas around muscular impressions. Measurements. Length 12.8 mm. *Genital operculum*: length 3.5 mm., width 6.0 mm.

ALLOTYPE. Female: similar to male, genitalia as illustrated in figure 16b.

TYPE DATA. Holotype: male, collected in Guatemala, from Yecopan, by Elishewitz, 8 October 1944. Allotype: female, collected in Guatemala, Yepocapa, by H. Elishewitz, March-June 1935. Both are deposited in the American Museum of Natural History.

DISTRIBUTION. (Figure 35). This species is known only from the above localities.

Paraphrynus laevifrons (Pocock), new combination.
(Figures 18, 19a-g, 20a-e.)

Tarantula laevifrons Pocock, 1894, p. 297-280.
Neophrynus fuscimanus (in part); Kraepelin, 1895, p. 25.
Hemiphrynus laevifrons Pocock, 1902b, p. 55-56.

DIAGNOSIS. Dark reddish brown and of large size (holotype measures 26 mm. long). Pedipalp basitarsus with Bd-I shorter than Bd-III as in *P. astes* and *P. viridiceps* (fig. 19e). This character separates these three species from all other described species of *Paraphrynus*. Difference between lengths of Fv-I and II conspicuously less than difference between Fv-II and III, so that these first three spines do not diminish evenly in length (fig. 19c). Td-VII slightly longer than Td-II but never shorter (fig. 19b). *Paraphrynus laevifrons* can be distinguished from *P. astes* and *P. viridiceps* in the following ways: the latter two with Bv-III as short as or shorter than Bd-I (figs. 22e, 24e) and with three teeth on outer edge of anteroventral surface of basal cheliceral segment (figs. 22i, 24h); *P. laevifrons* with Bv-III much longer than Bd-I and almost as long as Bd-III (fig. 19e) and with fewer than three teeth on outer edge of anteroventral surface of basal cheliceral segment (fig. 19g). Other specimens described as forms of *P. laevifrons* differ from the holotype in the following ways: difference between lengths of Fv-I and II about equal to difference between Fv-II and III; i.e., these first three spines appear to have an even diminution in length (fig. 20a).

Td-V as long as or longer than Td-II (fig. 20b).

REDESCRIPTION OF HOLOTYPE (Female). CARAPACE. Anterior edge nearly straight. Distance of median ocular tubercle from anterior edge less than length of tubercle. Color dark reddish brown. Measurements. Length 9.0 mm., width 13.5 mm., sulcus from anterior edge 5.3 mm. *Median ocular tubercle*: length 0.8 mm., width 0.9 mm., distance from anterior edge 0.4 mm. *Lateral eyes*: from each other 4.0 mm., from lateral edge 2.0 mm., from anterior edge 1.5 mm.

CHELICERAE. Dorsal surface of basal segment without anterior setiferous tubercles. Anteroventral surface of same segment with one tooth on outer edge (fig. 19g).

PEDIPALPS. *Trochanter* with five spines, tr-V located on inner lateral surface and about same length as tr-III. *Femur* with Fd-IV small, about half the length or less of Fd-VI; ventrally, difference in length between Fv-I and II conspicuously less than difference in length between Fv-II and III; Fv-III slightly longer than Fv-V; Fv-IV slightly shorter than Fv-VI. *Tibia* with Td-V less than half the length of Td-VI and slightly shorter than Td-II; Td-VII longer than Td-II and V; difference between length of Td-VII and VIII conspicuously greater than difference between lengths of Td-VIII and IX; ventrally, Tv-I slightly shorter than Tv-IV and about the same length as Tv-VI. *Basitarsus* with Bd-I shorter than Bd-III; Bv-III much longer than Bd-I. *Tarsus* with dorso-inner lateral surface with a small inconspicuous spine on proximal end; tarsus and post-tarsus fused, no suture separating these areas. Measurements. *Femur*: length 7.5 mm., width 2.0 mm. *Tibia*: length 9.0 mm., width 2.5 mm., length of longest dorsal spine (Td-III) 3.5 mm. *Basitarsus*: length 4.5 mm., width 1.5 mm. *Tarsus*: length 5.0 mm.

LEGS. Femora not uniform in color but appear banded. Second tarsomere of all tarsi without light transverse line on distal end. Measurements. *Antenniform leg*: (femur) 25.0 mm. *Leg II*: (femur) 17.0 mm., (tibia) 17.5 mm., tarsi broken off. *Leg III*: (femur) 18.0 mm., (tibia) 20.0 mm., (basitarsus) 8.5 mm., (tarsus) first segment 1.8 mm., second segment 0.8 mm., fourth segment 1.3 mm. *Leg IV*: (femur) 15.5 mm., tibiae, basitarsi, and tarsi broken off.

ABDOMEN. Color patterns indistinct and discolored; however, general appearance is dark reddish brown. Measurements. Length 17.0 mm. *Genital operculum*: length 2.3 mm., width 4.3 mm. Male genitalia of Panamanian form as illustrated (fig. 20e).

TYPE DATA. Holotype: female. Label reads "1850 . 12. West coast of America probably Ecuador or Colombia. Officers of H. M. ships Herald and Pandora, Coll. Capt. Kellett C. C., and Lieut. Wood." Deposited in the British Museum (Natural History).

DISTRIBUTION. Known from Nicaragua to Panama (fig. 36), and from the type locality, South America.

FORMS. Four distinct forms can be recognized: from Panama, Grutas del Venado, Guanacaste, and Quezaltepeque.

The holotype most closely resembles specimens of the Panamanian form. The taxonomic significance of these forms is uncertain and future studies may place them in a more precise taxonomic category. The forms can be differentiated by size and color, but more importantly by comparative lengths of certain pedipalp spines. The most extreme differences in these lengths occur between the Panamanian and Grutas del Venado forms. The Panamanian form has Td-II longer than Td-V and in some specimens their lengths approach equality (fig. 19b). The Grutas del Venado form, however, generally has Td-II shorter than Td-V (fig. 20b). In those cases where the Panamanian form has Td-II and V almost equal in length, it can be distinguished from the Grutas del Venado form by the length of Fv-III; Fv-III is short so that the difference between it and Fv-II is conspicuously greater than the difference between Fv-I and II (fig. 19c). In the Grutas del Venado form the differences between the lengths of Fv-I, II, and III appear equal (fig. 20a). The Guanacaste and Quezaltepeque forms most closely resemble the Grutas del Venado form, with the Guanacaste form smaller in size and having shorter spines (fig. 20c, d). These and other differences are presented on table 1.

RECORDS. *Panamanian form*: COLOMBIA. San Andreas Island, near electric plant, 19 February 1969, Hogue and Bright, coconut husk pile, 3 males, 1 female (LACMNH). COSTA RICA. [*Puntarenas Province*:] Rincon de Osa, 11 March 1969, D. C. Rentz, 1 female (CAS). PANAMA. *Canal Zone*: Barro Colorado Island, 10 May 1929, H. H. Cleaves, 1 female (AMNH); Barro Colorado Island Collection, W. C. Allee, University of Chicago, 1 male, 3 immature of undetermined sex, (MCZ); Ancon, September 1906, E. M. Keyser., 1 male (MCZ); Balboa, 18 March 1954, W. E. Lundy, 1 male (AMNH); Fort Clayton, 2 January 1945, K. E. Frick, 2 females (CAS); Chilibrillo Cave. Buenos Aires, 26 July 1966, S. Peck, 1 male (AMNH); 3 miles SW. Arraijord, 22 October 1945, Michener, 1 female; Barro Colorado Island, 26 March 1952, C. W. Rettenmeyer, 1 female (UK). [*Cocle Province*:] El Valle de Anton, 1 April 1945, C. D. Michener, 2 females (AMNH). *Panama Province*: Chilibrillo Cave, December 1946, H. Trapido, 2 immature females, 2 immatures of undetermined sex (AMNH).

Grutas del Venado form: COSTA RICA. [*Cartago Province*:] Tuccurique, Valerio, 1 male (MCZ). [*Guanacaste Province*:] Las Grutas del Venado, 13 mi. NE. Arenal, Guanacaste, 9 April 1963, R. Casebeer, 1 male, 1 female (LACMNH). No locality data: 1 male (LACMNH).

Guanacaste form: COSTA RICA. *Alajuela Province*: Los Chiles, 24 May 1964, F. S. Truxal, 1 female (LACMNH). *Guanacaste Province*: Playas del Coco, 19 August 1965, S. J. Arnold, 1 male, 2 females (UCB); Port Parker, Elena Bay, 21 January 1938, 1 female (AMNH); Puerto Humo, Guanacaste, 16 July 1966, F. W. Fisk, 1 male (OSU). [*San Jose Province*:] San Jose, Valerio, 1 male (MCZ). NICARAGUA. *Occidental*

Department: [El] Polvon, McNeil, 1 male, 2 females (MCZ).

Unknown country: Rio Frios, 1 specimen (ZSM).

Quezaltepeque form: EL SALVADOR. Quezaltepeque, 500 m., 5 August 1963, D. Q. Cavagnaro, M. E. Irwin, 2 females, 1 male (CAS).

Paraphrynus astes Mullinex, new species.

(Figures 21, 22a-i.)

DIAGNOSIS. A large species (length of holotype 30 mm.); color in alcohol pale brown. Bd-I shorter than Bd-III (fig. 22e). *Paraphrynus astes* is most closely related to *P. viridiceps* and *P. laevifrons*, the only other species with this latter character. Difference between lengths of Fv-I and II conspicuously less than difference in length between Fv-II and III, these first three spines not appearing to diminish evenly in length (fig. 22c). Td-VII longer than Td-II. Difference between lengths of Td-VII and VIII conspicuously greater than difference between Td-VIII and IX. *Paraphrynus astes* and *P. viridiceps* are distinguished from *P. laevifrons* in the following ways: the latter with a fifth spine (tr-V) on inner lateral surface of pedipalp trochanter (fig. 19f); with Bv-III longer than Bd-I (fig. 19e); with one or two teeth on outer edge of anteroventral surface of basal cheliceral segment (fig. 19g). *Paraphrynus astes* and *P. viridiceps* without a fifth spine on inner lateral surface of pedipalp trochanter (fig. 22f); with Bv-III as short as or shorter than Bd-I (fig. 22e); with three teeth on outer edge of anteroventral surface of basal cheliceral segment (fig. 22i). *Paraphrynus astes* is easily distinguished from *P. viridiceps* by the presence of clavate setae on the inner lateral surface of the basal cheliceral segment (fig. 22h). In *P. viridiceps*, acuminate setae are found on the same surface (fig. 24g).

DESCRIPTION OF HOLOTYPE (Male). CARAPACE. Color pale reddish brown. Anterior edge slightly bilobed. Distance of median ocular tubercle from anterior edge greater than length of tubercle. Median ocular tubercle small. Measurements. Length 12.0 mm., width 18.0 mm., sulcus from anterior edge 7.0 mm. *Median ocular tubercle*: length 0.8 mm., width 0.8 mm., from anterior edge 0.9 mm. *Lateral eyes*: from each other 6.8 mm., from lateral edge 2.5 mm., from anterior edge 2.3 mm.

CHELICERAE. Outer edge of anterodorsal surface of basal segment with well developed setiferous tubercle. Anteroventral surface of basal segment with three teeth on outer edge. Inner lateral surface of this segment with clavate setae.

PEDIPALPS. *Trochanter* with four spines, no fifth spine on inner lateral surface. *Femur* with Fd-IV same length or slightly shorter than Fd-VI; ventrally, difference between lengths of Fv-I and II conspicuously less than difference between lengths of Fv-II and III; Fv-III slightly shorter

than Fv-V; Fv-IV somewhat shorter than Fv-VI and situated closer to Fv-V than III. *Tibia* with Td-II, V, and VII about equal in length, with Td-VII slightly longer than Td-II; difference between lengths of Td-VII and VIII conspicuously greater than difference between lengths of Td-VIII and IX; ventrally with Tv-I and IV about equal in length and slightly longer than VI; Tv-II shorter than V. *Basitarsus* with Bd-I shorter than Bd-III and longer than Bv-III.

Tarsus with dorso-inner lateral surface of proximal end with a small inconspicuous spine; tarsus and post-tarsus appearing fused from dorsal, ventral, and outer lateral views; however, inner lateral surface has an apparent suture.

Measurements. *Femur*: length 14.0 mm., width 2.3 mm.

Tibia: length 14.5 mm., width 2.5 mm., length longest dorsal spine (Td-III) 4.5 mm. *Basitarsus*: length 6.3 mm., width 2.3 mm. *Tarsus*: length 6.8 mm.

LEGS. Color uniform light yellow-brown. Second tarsomere with light transverse line on all tarsi. Measurements.

Antenniform leg: (femur) 23.0 mm. *Leg II*: (femur) 18.0 mm., (tibia) 17.0 mm., basitarsi and tarsi broken off.

Leg III: (femur) 18.0 mm., (tibia) 18.5 mm., basitarsi and tarsi broken off. *Leg IV*: (femur) 14.8 mm., (tibia) first segment 11.0 mm., second segment 2.0 mm., third segment 5.0 mm., basitarsi and tarsi broken off.

ABDOMEN. Dorsal surface yellow-brown. Measurements. Length 13.3 mm. *Genital operculum*: length 2.8 mm., width 5.3 mm.

TYPE DATA. Holotype: male, from Cueva de las Cucarachas Patana, Baracoa, Oriente. Deposited in the American Museum of Natural History.

DISTRIBUTION. This species known only from Cuba (fig. 37).

REMARKS. Only a single specimen, the holotype, is known. So far this is the only described species of *Paraphrynus* with clavate setae on the inner lateral surface of the basal cheliceral segment. Two other species in the order have been reported to have such setae, *Muscodamon atlanteus* Fage (1939) and *Acanthophrynus coronatus* (Butler) (Shear, 1970). The setae appear to be stridulatory in function. In *A. coronatus*, a definite sound can be heard when the chelicerae are moved alternately up and down (Shear, 1970).

Another character unique to *P. astes* and *P. viridiceps* is the number of teeth on the outer edge of the antero-ventral surface of the basal cheliceral segment. In these two species there are three teeth instead of the usual one or two in other species of *Paraphrynus*. The first tooth is common to all species of *Paraphrynus* and is the most proximal.

Paraphrynus viridiceps (Pocock), new combination.
(Figures 23, 24a-h.)

Tarantula viridiceps Pocock, 1893, pp. 540-541.

Neophrynus fuscimanus (in part); Kraepelin, 1895, p. 25.

DIAGNOSIS. Color pale yellow-brown. Length of holotype 15 mm. Bd-I shorter than Bd-III (fig. 24e). This latter character associates *P. viridiceps* most closely with *P. astes* and *P. laevifrons*. Fv-I, II, and III not diminishing evenly in length, the difference between lengths of Fv-I and II conspicuously less than the difference between Fv-II and III (fig. 24c). *Paraphrynus viridiceps* and *P. astes* are easily distinguished from *P. laevifrons* in the following ways: the latter with a fifth spine (tr-V) on inner lateral surface of pedipalp trochanter (fig. 19f); with Bv-III longer than Bd-I (fig. 19e); with one or two teeth on outer edge of anteroventral surface of basal cheliceral segment (fig. 19g). *Paraphrynus viridiceps* and *P. astes* without fifth spine on inner lateral surface of pedipalp trochanter (fig. 24f); with Bv-III as short as or shorter than Bd-I (fig. 24e); with three teeth on outer edge of anteroventral surface of basal cheliceral segment (fig. 24h). *Paraphrynus viridiceps* is most easily distinguished from *P. astes* by the presence of acuminate setae on the inner lateral surface of the basal cheliceral segment (fig. 24g) instead of the clavate setae in *P. astes* (fig. 22h).

REDESCRIPTION OF HOLOTYPE (Male). CARAPACE. Anterior edge bilobed. Distance of median ocular tubercle from anterior edge greater than length of tubercle. Median ocular tubercle conspicuously wider than long. Lateral eyes closer to lateral edge than to median longitudinal groove. Measurements. Length 6.0 mm., width 9.0 mm., sulcus from anterior edge 3.5 mm. *Median ocular tubercle:* length 0.4 mm., width 0.7 mm., from anterior edge 0.5 mm. *Lateral eyes:* from each other 3.3 mm., from lateral edge 1.3 mm., from anterior edge 1.3 mm.

CHELICERAE. Outer edge of anterodorsal surface of basal segment with setiferous tubercle. Anteroventral surface of same segment with three teeth on outer edge.

PEDIPALPS. *Trochanter* with four spines, no fifth spine on inner lateral surface or at most a setiferous tubercle in its place. *Femur* with Fd-IV a minute spinule, much smaller than Fd-VI; ventrally, difference between lengths of Fv-I and II conspicuously less than difference between Fv-II and III; Fv-III slightly shorter than Fv-V; Fv-IV small and located close to Fv-V; Fv-VI slightly shorter than Fv-III and about two-thirds the length of Fv-V; *Tibia* with Td-V and VII equal in length and slightly shorter than Td-II; Td-II approximately same length as Td-IV; Td-I about half the length or less of Td-V; Td-VII, VIII and IX with uneven diminution in length; i.e. difference between Td-VII and VIII conspicuously greater than difference between Td-VIII

and IX; ventral surface smooth with coarse granules ending before base of spines. *Basitarsus* with Bd-I shorter than Bd-III; Bv-III much smaller than Bd-I. *Tarsus* with dorso-inner lateral surface of proximal end of segment with a small spine; tarsus and post-tarsus completely fused without suture on dorsal, ventral, or lateral surfaces. Measurements. *Femur*: length 5.8 mm., width 1.3 mm. *Tibia*: length 6.3 mm., width 1.5 mm., length of longest dorsal spine (Td-III) 1.8 mm. *Basitarsus*: length 3.0 mm., width 1.3 mm. *Tarsus*: 3.5 mm.

LEGS. Measurements. *Antenniform leg*: (femur) 11.3 mm. *Leg II*: (femur) 7.5 mm., (tibia) 7.0 mm., (basitarsus) 3.5 mm., tarsi broken off. *Leg III*: (femur) 8.0 mm., (tibia) 8.0 mm., basitarsi and tarsi broken off. *Leg IV*: (femur) 7.0 mm., (tibia) first segment 5.0 mm., second segment 0.8 mm., third segment 2.0 mm., basitarsi and tarsi broken off.

ABDOMEN. Measurements. Length 6.5 mm. *Genital operculum*: length 1.5 mm., width 3.0 mm.

TYPE DATA. Holotype: male, from Bahamas, "collector Mrs. Blake, gov't house, Bahamas." Deposited in the British Museum (Natural History).

DISTRIBUTION. (Figure 37). West Indies.

RECORDS. BAHAMAS. Andros Island, south side of S. Bight, 18 May 1904, 1 male, 1 female, 1 sex undetermined (AMNH); Nassau, summer 1945, A. S. Verney, 2 females (AMNH); Bahamas, N. Banks, 1 male (MCZ). CUBA. Santa Clara, Sierra de Jaticonoco, April 1911, coll. B. B., 2 females (AMNH).

REMARKS. Holotype is discolored and in very poor condition. The other specimens of *P. viridiceps* are larger in size and have a dark reddish brown carapace and a pale yellowish brown abdomen.

Paraphrynus velmae Mullinex, new species.
(Figures 25, 26a-g.)

DIAGNOSIS. Medium in size (length of holotype 17.5 mm.); color in alcohol pale brown. Bd-I longer than Bd-III (fig. 26e). First three spines on ventral surface of pedipalp femur diminishing evenly in length, difference in length between Fv-I, II, and III being about equal (fig. 26c). Proximal end of dorso-inner lateral surface of pedipalp tarsus smooth, without a small spine (fig. 26g). Pedipalp tarsus and post-tarsus separated by a distinct suture; i.e., these segments not fused (fig. 26g). Median eyes and median ocular tubercle absent; lateral eyes present (fig. 25). This species is most similar to *P. baeps* whose median pair of eyes are present but are greatly reduced in size and not situated on an ocular tubercle (fig. 27).

DESCRIPTION OF HOLOTYPE (Female). CARAPACE. Color pale brown. Anterior edge straight with several long setae. Dorsal surface with patterns of very fine granules; some coarse granules present posteriorly and a few inconspicuous ones in area between lateral eye groups. Median ocular

tubercle absent as are median pair of eyes. Lateral eyes present though somewhat reduced and situated closer to lateral edge of carapace than to center groove. Measurements. Length 6.0 mm., width 8.5 mm., sulcus from anterior edge 4.3 mm. *Lateral eyes:* from each other 3.5 mm., from lateral edge 1.3 mm., from anterior edge 1.3 mm.

CHELICERAE. Anterodorsal surface of basal segment without setiferous tubercle. Basal segment with two teeth on outer edge of anteroventral surface.

PEDIPALPS. Color pale brown as in carapace. Dorsal, ventral, and lateral surfaces without fine granules, but with coarser setiferous granules. *Trochanter* with tr-III and IV about equal in length and slightly shorter than tr-I. *Femur* with Fd-IV longer than Fd-VI, and greater than half the length of Fd-V; first two ventral spines with several long conspicuous setae growing along sides; length of setae greater than width of spine; first three ventral spines diminishing evenly in length, difference in length between Fv-I, II, and III being about equal; Fv-IV longer than Fv-VI and greater than half the length of Fv-V. *Tibia* with Td-II, V, and VII about equal in length, Td-V being slightly longer; Td-VII, VIII, and IX with an even diminution in length; ventrally, Tv-I shorter than Tv-III; Tv-IV longer than Tv-VI; with smaller well developed spines between major spines. *Basitarsus* with Bd-I longer than Bd-III; two spines present between Bd-II and III and an additional two located distal to Bd-III; ventrally, Bv-I and III well developed and about equal in length; one spine located proximal to Bv-I, two spines between Bv-II and III, one distal to Bv-III. *Tarsus* without a small proximal spine on dorso-inner lateral surface; tarsus and post-tarsus separated by a distinct suture. Measurements. *Femur:* length 7.0 mm., width 1.3 mm. *Tibia:* length 7.0 mm., width 1.5 mm., length of longest dorsal spine (Td-III) 2.0 mm. *Basitarsus:* length 3.8 mm., width 1.3 mm. *Tarsus:* 3.8 mm.

LEGS. Yellow-brown and slightly lighter than pedipalps with exception of femur of antenniform leg which is concolorous with pedipalps. Second tarsomere of all tarsi with a light transverse line on distal end of lateral surface resembling a suture. Measurements. *Antenniform leg:* (femur) 28.3 mm. *Leg II:* (femur) 16.5 mm., (tibia) 16.3 mm., (basitarsus) 9.8 mm., (tarsus) first segment 1.8 mm., second segment 0.8 mm., fourth segment 1.0 mm. *Leg III:* (femur) 18.0 mm., (tibia) 19.3 mm., (basitarsus) 10.3 mm., (tarsus) first segment 2.0 mm., second segment 0.8 mm., fourth segment 1.3 mm. *Leg IV:* (femur) 15.5 mm., (tibia) first segment 11.3 mm., second segment 2.8 mm., third segment 5.8 mm., (basitarsus) 10.0 mm., (tarsus) first segment 2.0 mm., second segment 0.8 mm., fourth segment 1.3 mm.

ABDOMEN. Dorsal surface a uniform pale yellow color and lighter than legs. Measurements. Length 11.5 mm. *Genital operculum:* length 3.0 mm., width 4.5 mm.

TYPE DATA. Holotype: female, from Mexico: San Luis Potosi: Sotano de Tlamaya, 13 July 1964, T. Raines collector.

Allotype: male, from Mexico: San Luis Potosi: Sotano de Huitzmolotitla, 2 km. SW. Tlamaya and about 10 km. N. Xilitla, 24 January 1964, T. Raines, T. Philips collectors.

In addition there are two male paratypes. One is from the same locality as allotype and the other from San Luis Potosi: Sotano de Tlamaya, 7 August 1966, T. Raines collector.

Holotype, allotype, and one paratype are deposited in the American Museum of Natural History. One paratype is deposited in the California Academy of Sciences.

DISTRIBUTION. (Figure 38). San Luis Potosi, Mexico.

REMARKS. According to the label, the allotype and a paratype were collected in "mud room, 9000 ft. from entrance."

The absence of the median pair of eyes in *P. velmae* is unique in the Phrynidae and the Tarantulidae. One species described in the Charontidae, *Paracharon caecus* Hansen, 1921, is completely devoid of eyes. This species inhabits the nests of termites and is reported from Guinea Bissau. The species, *velmae*, is named for my late mother, Velma Bearden Mullinex.

Paraphrynus baeops Mullinex, new species.
(Figures 27, 28a-i.)

DIAGNOSIS. Medium sized species (length of holotype 19.5 mm.); color in alcohol medium brown. Bd-I longer than Bd-III (fig. 28e). First three spines on ventral surface of pedipalp femur diminishing evenly in length; i.e., difference between Fv-I, II, and III about equal (fig. 28c). Proximal end of dorso-inner lateral surface of pedipalp tarsus without a small spine (fig. 28g). Pedipalp tarsus and post-tarsus fused; i.e., no suture separates these two areas (fig. 28g). Darkly pigmented median ocular tubercle absent, but two reduced eyes present (fig. 27).

DESCRIPTION OF HOLOTYPE (Female). CARAPACE. Color medium brown. Anterior edge slightly bilobed. Darkly pigmented median ocular tubercle absent, this ocular area being concolorous with rest of carapace. Two median eyes present, though reduced in size. Measurements. Length 7.3 mm., width 11.0 mm., sulcus from anterior edge 4.5 mm. *Lateral eyes*: from each other 4.0 mm., from lateral edge 1.3 mm., from anterior edge 1.5 mm.

CHELICERAE. Basal segment with one tooth on outer edge of anteroventral surface.

PEDIPALPS. Medium brown as in carapace. Dorsal, ventral and lateral surfaces with coarse and fine granules. Ventrally, *gnathocoxa* with a narrow area of white ventrad to the longitudinal row of setae located on white mesal surface. *Femur* with Fd-IV slightly longer than VI; first two ventral spines with thin inconspicuous setae growing

along sides; length of setae less than width of spine; first three ventral spines with an even diminution in length with difference between lengths of Fv-I, II, and III about equal; Fv-IV greater in length than Fv-VI; between Fv-IV and V is a spine whose length is about equal to that of Fv-VI. *Tibia* with Td-II, V, and VII about equal in length with Td-V slightly longer; Td-VII, VIII, and IX with an even diminution in length with difference between lengths of these spines about equal; ventrally, Tv-I slightly shorter than Tv-III; Tv-IV about same length as Tv-VI; with smaller spines between major spines. *Basitarsus* with Bd-I longer than Bd-III; three spines between Bd-II and III, and three minute spines distal to III; ventrally, Bv-I and III well developed with Bv-I slightly longer; three spines located between Bv-II and III with the spine directly proximal to III equal to half the length, or greater, than III. *Tarsus* without small spine on proximal end of dorso-inner lateral surface; tarsus and post-tarsus fused, no suture separating these two areas. Measurements. *Femur*: length 8.0 mm., width 1.7 mm. *Tibia*: length 8.5 mm., width 1.7 mm., length of longest dorsal spine (Td-III) 4.0 mm. *Basitarsus*: length 4.5 mm., width 1.5 mm. *Tarsus*: length 4.8 mm.

LEGS. Yellow-brown and lighter than pedipalps, except for femur of antenniform legs which is darker and about same color as pedipalps. Second tarsomere of all tarsi with light transverse line on distal end. Measurements. *Antenniform leg*: (femur) 30.0 mm. *Leg II*: (femur) 17.0 mm., (tibia) 17.0 mm., (basitarsus) 9.0 mm., (tarsus) first segment 2.0 mm., second segment 0.7 mm., fourth segment 1.2 mm. *Leg III*: (femur) 19.0 mm., (tibia) 21.0 mm., (basitarsus) 8.8 mm., (tarsus) first segment 2.0 mm., second segment 0.6 mm., fourth segment 1.3 mm. *Leg IV*: (femur) 16.0 mm., (tibia) first segment 12.0 mm., second segment 2.5 mm., third segment 7.0 mm., (basitarsus) 18.8 mm., (tarsus) first segment 2.0 mm., second segment 0.8 mm., fourth segment 1.5 mm.

ABDOMEN. Dorsal surface uniform pale yellow, lighter than legs. Measurements. Length 13.5 mm. *Genital operculum*: length 2.5 mm., width 5.0 mm.

TYPE DATA. Holotype: female, from Mexico: Tamaulipas: Sotano de Vasquez, 10 km. SE. Ocampo, 29 December 1972, R. Jameson, P. Duncan. Allotype: male, locality same as holotype. Paratype: one male, from Tamaulipas: Grutas del Puente, 5 mi. SE. Ocampo, 13 July 1967, J. Reddell, J. Fish. Holotype and allotype are deposited in the American Museum of Natural History. Paratype is deposited in the California Academy of Sciences.

RECORDS. MEXICO. *Tamaulipas*: La Cueva de la Florida, 15 km. SW. Ciudad Mante, 5 January 1970, V. Tipton (right hand passage) 1 immature male (belonging to Willis J. Gertsch).

DISTRIBUTION. (Figure 39). Only localities known are the above mentioned in Tamaulipas.

Paraphrynus mexicanus (Bilimek), new combination.
(Figures 29a-i.)

Phrynus mexicanus Bilimek, 1867, pp. 905-906.

Neophrynus fuscimanus (in part); Kraepelin, 1895, p. 25.

Paraphrynus mexicanus was first synonymized with *P. fuscimanus* by Kraepelin (1895). He also added to this synonymy four of Pocock's species (*Phrynus laevifrons*, *P. azteca*, *P. macrops*, and *P. viridiceps*). In subsequent publications, Pocock nevertheless considered his own species as valid. Not having examined the holotypes of either *P. fuscimanus* or *P. mexicanus*, he left the latter as a junior synonym of the former. This synonymy has been accepted by later workers.

In this paper *P. fuscimanus* is considered a *nomen dubium*. As a result *P. mexicanus* is taken out of synonymy with *P. fuscimanus* and is considered a valid species.

No specimens of *P. mexicanus* labeled as the holotype can be located. However the Naturhistorisches Museum, Wien, possesses specimens that appear to belong to this species and which were collected by Bilimek at the type-locality, Cave of Cacahuamilpa. These specimens as well as all others examined from the type-locality are conspecific. The following diagnosis therefore is based on these topotypic specimens.

DIAGNOSIS. Bd-I longer than Bd-III (fig. 29e). Difference between lengths of Fv-I and II appear equal to difference between Fv-II and III; i.e., these first three spines diminish evenly in length (fig. 29h). Ventral surface of gnathocoxa with broad area of white ventrad to the longitudinal row of setae located on unpigmented mesal surface (fig. 29d). With (fig. 29b) or without (fig. 29c) a thin light transverse line located distally on second tarsomere. *Paraphrynus mexicanus* superficially resembles *P. azteca*. However *P. azteca* possesses a narrow white area ventrad to the longitudinal row of above-mentioned setae (fig. 34h) and always a thin light transverse line on second tarsomere (fig. 31c). It also has two teeth on the outer edge of the anteroventral surface of the basal cheliceral segment (fig. 34g), while *P. mexicanus* has only one tooth.

Paraphrynus mexicanus is a reddish brown species of medium size. The pedipalp spines are generally short with the longest dorsal tibial spine not greatly exceeding the width of the segment (fig. 29f). The pattern of comparative lengths of pedipalp spines resembles that of *P. azteca*. The length of Td-V seems to vary from shorter to longer than Td-VII. Three distinct forms can be recognized. The Cuban and Cacahuamilpan forms are medium reddish brown, while the Arizonan form is very dark brown with the carapace and pedipalps almost blackish in color. The Cuban form can be distinguished from the Cacahuamilpan and Arizonan forms by the presence of a thin light transverse line located

distally on second tarsomere (fig. 29b) and by the very short pedipalp spines (fig. 29a). In contrast, the latter two forms do not possess the transverse line mentioned above, this tarsal segment being uniform in color (fig. 29c). These forms can be distinguished from each other by the amount of granulation of the ventral surface of the pedipalp tibia. In the Arizonan form this surface is quite granular with coarse granules occurring up to the base of the spines (fig. 29i). The Cacahuamilpan form is less granular with coarse granules ending before the base of the spines on this surface (fig. 29g). The Arizonan form also possesses a fairly well developed setiferous tubercle on the outer anterodorsal edge of the basal cheliceral segment; the Cacahuamilpan form lacks such a tubercle.

DISTRIBUTION. (Figure 39). The Cacahuamilpan form occurs in Mexico in the states of Guerrero, Puebla, and Oaxaca. The Arizonan form occurs in Sonora, Mexico, and in the southern parts of Arizona and California in the United States. The Cuban form is known only from Cuba (fig. 37).

RECORDS. *Cacahuamilpan form:* MEXICO. *Guerrero:* Grutas de Cacahuamilpa, 15 August 1966, J. Fish, J. Reddell, 1 female (AMNH); Grutas de Cacahuamilpa, 24 August 1965, J. Reddell, J. Fish, W. Bell, 2 females (AMNH); Gruta de Cacahuamilpa, 2 September 1966, J. and W. Ivie, 1 male, 1 female (AMNH); Cacahuamilpa Cave, entrance zone, 99°30'W.: 18°10' N., 4 May 1963, W. J. Gertsch, W. Ivie, 1 male (AMNH); Cacahuamilpa, 24 March 1963, unter Holz, J. Hendrichs S., 1 male (AMNH); Grutas del Mogote, 10 mi. N. of Cacahuamilpa, 25 August 1965, J. Reddell, J. Fish, W. Bell, 1 male (AMNH); Grutas del Mogote, 22 December 1966, T. Raines, 2 females (AMNH); Grutas de Juxtlahuaca, 15 August 1966, J. Fish, J. Reddell, 2 females (AMNH). *Mexico D. F.:* Gruta de la Estrella, 17 August 1966, J. Fish, J. and J. Reddell, 1 male, 1 female (AMNH). *Oaxaca:* 10 mi. S. Tomellin, 14 August 1967, J. Reddell, J. Fish, T. Evans, 3 males (AMNH); 5 mi. N. Huautla, Milliped cave, June 1965, B. Russel, 2 males (AMNH); 30 mi. N. Telixtlahuaca, 14 August 1967, J. Reddell, J. Fish, T. Evans, 1 male (AMNH). *Puebla:* Tehuacan, 24 July 1956, W. Gertsch, V. Roth, 2 males (AMNH).

Arizonan form: MEXICO. *Sonora:* 6 mi. E. Navojoa, 23 August 1965, W. J. Gertsch, R. Hastings, 1 male (AMNH); 7 mi. S. of Nacozari, 15 August 1959, B. A. Branson?, 1 female (AMNH); Alamos, 1942, C. M. Bogert, 1 male (AMNH); Guirocoba, 28 July 1961, C. Parrish, 1 female, 1 male (CAS). **UNITED STATES.** *Arizona:* Lukeville, water valve box, 31 August 1965, T. Briggs, 2 females (TSB); Organ Pipe Cactus National Monument, Pima County, 7 August 1968, T. Briggs, 1 female (TSB); Organ Pipe Cactus National Monument, Pima County, 31 August 1965, V. F. Lee, 1 male (CLM); Organ Pipe Cactus National Monument, Pima County, restroom, 22 August 1968, K. E. Lucas, 2 females, 1 male (KEL); Wickenburg, Maricopa County, 18 August 1958, L. A. Stange, 1 male (LACMNH); Maricopa County, Phoenix, south Mountain Study area, south facing slope, 11 September 1966, S. C. Williams,

1 male (SCW); Yuma County, Hovatter Ranch, Little Horn Mts., 8 May 1960, W. J. Gertsch, V. Roth, 1 female (AMNH); Yuma County, N. Banks, 1 male (MCZ). *California*: Earp, September 1938, W. L. Miller, 1 male (LACMNH); Imperial County, Ogilby, 12 March 1953, J. C. Couffer, 1 male (LACMNH).

Cuban form: CUBA. Cayanas, N. Banks, 2 males (MCZ); Havana, N. Banks, 1 female (MCZ); Cuba, 1 male (MCZ).

Paraphrynus pocoocki Mullinex, new species.
(Figures 30a-b, 31a-c, 32a-i.)

DIAGNOSIS. Medium sized species (Length of holotype 23 mm.); color medium reddish brown with lighter abdomen. Bd-I longer than Bd-III (fig. 32e). Difference between lengths of Fv-I and II appearing equal to difference between Fv-II and III (fig. 32c). Resembles *P. azteca* in that ventrally, gnathocoxa has narrow area of white ventrad to the longitudinal row of hairs located on inner white area (fig. 32h). Can be distinguished from *P. azteca* and other species of *Paraphrynus* by presence of an elongate area devoid of setae on ventral pigmented surface of gnathocoxa. This area is located basal to the endite and adjoining the inner white area (fig. 32h). Other species have setae occurring to the edge of the white area with no such region devoid of setae (fig. 34h). Can also be distinguished from *P. azteca* by the number of teeth on the outer edge of the anteroventral surface of the basal cheliceral segment. *Paraphrynus azteca* has two teeth there (fig. 34g) while *P. pocoocki* has only one (fig. 32g).

DESCRIPTION OF HOLOTYPE (Female). CARAPACE. Anterior edge bilobed. Distance of median ocular tubercle from anterior edge equal to less than length of tubercle. Color of carapace reddish brown. Measurements. Length 7.5 mm., width 11.5 mm., sulcus from anterior edge 4.5 mm. *Median ocular tubercle*: length 0.5 mm., width 0.8 mm., distance from anterior edge 0.4 mm. *Lateral eyes*: distance from each other 3.4 mm., from lateral edge 1.5 mm., from anterior edge 1.3 mm.

CHELICERAE. Anteroventral surface of basal segment with one tooth on outer edge.

PEDIPALPS. *Gnathocoxa* with ventral surface of pigmented area with an elongate area devoid of conspicuous setae, located basal to endite and adjoining inner white area. *Trochanter* with tr-IV longer than tr-III and slightly shorter than tr-I. *Femur* with Fd-IV less than half the length of Fd-V and shorter than Fd-VI; first three ventral spines with an even diminution in length, difference between lengths of Fv-I and II appearing equal to difference between Fv-II and III; Fv-IV less than half the length of Fv-V, and shorter than Fv-VI. *Tibia* with Td-II and V about equal in length and slightly longer than Td-VII; Td-V less than half the length of Td-VI; ventrally, Tv-I longer than Tv-III; Tv-II slightly longer than Tv-V; Tv-IV and VI about equal

in length. *Basitarsus* with Bd-I longer than Bd-III; Bv-III well developed, greater than half the length of Bd-III. *Tarsus* and post-tarsus fused, no suture separating the two areas; proximal end without a small spine on dorso-inner lateral surface. Measurements. *Femur*: length 7.0 mm., width 1.8 mm. *Tibia*: length 8.0 mm., width 1.8 mm., length longest dorsal spine (Td-III) 2.5 mm. *Basitarsus*: length 3.5 mm., width 1.4 mm. *Tarsus*: length 4.0 mm.

LEGS. Antenniform femur same color as pedipalps and darker than femora of legs II, III, and IV. Second tarsomere of all tarsi with thin light transverse line on distal end. Measurements. *Antenniform leg*: (femur) 21.0 mm. *Leg II*: (femur) 14.0 mm., (tibia) 14.0 mm., (basitarsus) 7.0 mm., (tarsus) first segment 1.5 mm., second segment 0.7 mm., fourth segment 1.0 mm. *Leg III*: (femur) 15.0 mm., (tibia) 16.3 mm., (basitarsus) 7.3 mm., (tarsus) first segment 1.5 mm., second segment 0.8 mm., fourth segment 1.0 mm. *Leg IV*: (femur) 12.8 mm., (tibia) first segment 9.5 mm., second segment 1.8 mm., third segment 3.8 mm., (basitarsus) 6.5 mm., (tarsus) first segment 1.5 mm., second segment 0.6 mm., fourth segment 1.2 mm.

ABDOMEN. Measurements. Length 14.3 mm. *Genital operculum*: length 3.0 mm., width 5.0 mm. Female genitalia of holotype as illustrated (fig. 31b); male genitalia of allotype as illustrated (fig. 30b).

TYPE DATA. Holotype: female, from Mexico: Tamaulipas: Cueva de la Florida, 10 mi. SW. Mante, 2 February 1968, W. Russell. Allotype: male, same locality as holotype. Paratypes; two females, one male, from same locality as holotype. An additional female paratype is from San Luis Potosi: Hotel Covadonga, Valles, 1961, L. Steude. Holotype, allotype, and all but one female paratype are deposited in the American Museum of Natural History. Female paratype from type-locality is deposited in California Academy of Sciences.

DISTRIBUTION. (Figure 38). Known from the Mexican states of Tamaulipas and San Luis Potosi between Mante and Xilitla.

FORMS. The holotype of this species belongs to a shorter spined form, while another form is comprised of animals with longer spines and legs. Patterns and comparative lengths of spines, however, do not appear to be significantly different between these two forms. Both forms are found very close to each other in the area around Quintero and Valles. Among specimens of the longer spined form, there appears to be a more distinct group in which the spines are extremely long and in which the median ocular tubercle is much smaller (fig. 30a). In this group, Td-V is conspicuously longer than Td-II whereas the holotype has these two spines about the same length. The form with the small median ocular tubercle also appears to possess more setae basal to the endite and adjacent to the inner white area. The taxonomic status of this latter form is presently difficult to determine and it is thus best left as a form of this species.

RECORDS. The following specimens are excluded from the type-series. *Short spined form*: MEXICO. *San Luis Potosi*: WSW. Valles (Covadonga) 99°05'W.: 21°57'N., 16 August 1964, J. and W. Ivie, 1 male (AMNH); Cueva de Taninul, 6 July 1964, J. Reddell, D. McKensie, 1 female (AMNH); Sotano de Montecillos, 5 km. NE. of Valles, 24 July 1963, D. McKenzie, 1 of undetermined sex (AMNH); Sierra de la Abra, Sotano de la Tinaja, 18 February 1970, flood debris on mud slope, 1500 ft. from entrance, J. A. L. Cooke, 1 male (AMNH); Cueva de Tantobal, 14 mi. SE. Valles, 24 November 1967, W. Russell, 2 females, 1 male (AMNH). *Tamaulipas*: Sotano de El Venadito, 24 January 1965, T. Raines, 2 females, 1 male (AMNH).

Long spined form: MEXICO. Cueva Chica, 2 April 1946, B. J. Dontzin, E. Ruda, 1 male, 1 female (AMNH). *San Luis Potosi*: Sotano del Tigre, 10 mi. NE. Valles, 1 February 1968, J. Reddell, R. Mitchell, 1 male (AMNH); Sotano del Tigre, 10 mi. NE. Valles, 24 November 1967, J. Fish, J. Reddell, 2 males (AMNH); Cueva de Valdosa, 8 mi. E. Valles, 24 November 1967, J. Reddell, S. Fowler, 2 females, 1 male (AMNH); Cueva de los Sabinos, near Valles, lower level of cave, March 1946, B. J. Dontzin, E. Ruda, 1 male (AMNH); Cueva de Nacimiento de Rio Huichihuayan, at Huichihuayan, found in darkness, 24 April 1964, T. Raines, D. McKenzie, B. Bell, 1 female (AMNH); Pujal, cave no. 1, 12 March 1940, W. Bridges, 1 female (AMNH). *Tamaulipas*: Grutas de Quintero, 2 km. S. of Quintero, 28 November 1964, J. Reddell, 1 female (AMNH).

Small median ocular tubercle form: MEXICO. *Tamaulipas*: Cueva de San Rafael do los Castros, 10 April 1966, J. Fish, D. McKenzie, 1 female (AMNH); Grutas de Quintero, 8 mi. SW. Mante, 1967, R. Remington, 1 female (AMNH); Sotano de El Molino, 1964, T. Raines, 1 female, 1 male (AMNH).

Paraphrynus azteca (Pocock), new combination.
(Figures 33a-c, 34a-h.)

Tarantula azteca Pocock, 1894, pp. 280-281.

Neophrynus fuscimanus (in part); Kraepelin, 1895, p. 25.

Hemiphrynus azteca (Pocock), 1902b, p. 54.

DIAGNOSIS. Medium sized species (length of paratype 20 mm.). Bd-I longer than Bd-III (fig. 34e). First three spines on ventral surface of pedipalp femur diminishing evenly in length, difference between lengths of Fv-I and II appearing equal to difference between Fv-II and III (fig. 34c). The most closely related species are *P. mexicanus* and *P. pococki*. *Paraphrynus azteca* and *P. pococki* are most easily distinguished from *P. mexicanus* in the following way: in the former, on the ventral surface of the gnathocoxa, there is a narrow area of white ventrad to the longitudinal row of hairs located on the white mesal surface (figs. 32h, 34h). In contrast *P. mexicanus* has a broad area of white ventrad to this longitudinal row of hairs (fig. 29d).

Furthermore, two forms of *P. mexicanus* lack a thin light transverse line located distally on the second tarsomere (fig. 29c) which is present in *P. azteca* (fig. 31c). *Paraphrynus azteca* can be distinguished from *P. pococki* in the following ways: the latter has one tooth on the outer edge of the anteroventral surface of the basal cheliceral segment (fig. 32g); its ventral pigmented surface of gnathocoxa is devoid of conspicuous setae in an area located basal to the endite and adjoining the inner white area (fig. 32h); *P. azteca* has two proximal teeth on the outer edge of the anteroventral surface of the basal cheliceral segment (fig. 34g), and conspicuous setae occurring to the edge of the inner white area on the ventral surface of the gnathocoxa (fig. 34h). There appear to be at least two forms of *P. azteca*; the short spined form to which the paratype belongs and a long spined form.

DESCRIPTION OF FEMALE PARATYPE. CARAPACE. Anterior edge nearly straight. Distance of median ocular tubercle from anterior edge about equal to its longitudinal diameter. Measurements. Length 7.0 mm., width 11.5 mm., sulcus from anterior edge 4.3 mm. *Median ocular tubercle:* length 0.5 mm., width 0.8 mm., from anterior edge 0.4 mm. *Lateral eyes:* from each other 3.3 mm., from lateral edge 1.5 mm., from anterior edge 1.5 mm.

CHELICERAE. Dorsal surface of basal segment without distal tubercles. Anteroventral surface of this segment with two teeth on outer edge (fig. 34g). The second is the most proximal and appears to have been formed from the raising of a ridge connecting the distal outer tooth with the inner double pointed tooth.

PEDIPALPS. *Gnathocoxa* has ventral surface with a narrow area of white ventrad to longitudinal row of setae located on white mesal surface. Ventral pigmented area basal to the endite has setae occurring to edge of inner white area. *Trochanter* with tr-III and tr-IV about equal in length and slightly greater than half the length of tr-I. *Femur* with Fd-IV greater than half the length of Fd-V and slightly shorter than Fd-VI; difference between lengths of Fv-I and II appearing about equal to difference between lengths of Fv-II and III; Fv-IV about equal to half the length of Fv-V. *Tibia* with Td-II and VII about equal in length and slightly shorter than Td-V; length of longest tibial spine about equal to width of tibial segment; length of Tv-I intermediate between Tv-III and Tv-IV and about equal to that of Tv-VI; coarse and fine granules extend to base of spines. *Basitarsus* with Bd-I longer than Bd-III. *Tarsus* without a small proximal spine on dorso-inner lateral surface; tarsus and post-tarsus fused, no suture separating these two areas. Measurements. *Femur:* length 7.0 mm., width 1.5 mm. *Tibia:* length 7.5 mm., width 2.0 mm., length of longest dorsal spine (Td-III) 2.0 mm. *Basitarsus:* length 3.3 mm., width 1.5 mm. *Tarsus:* length 3.8 mm.

LEGS. Femur of antenniform leg less than twice the width of carapace. Femur of fourth leg about equal to width

of carapace. Second tarsomere with a thin light transverse line. Measurements. *Antenniform leg*: (femur) 18.0 mm. *Leg II*: (femur) 13.5 mm., (tibia) 12.3 mm., (basitarsus) 6.8 mm., tarsi broken off. *Leg III*: (femur) 14.5 mm., tibiae, basitarsi, and tarsi broken off. *Leg IV*: (femur) 11.0 mm., (tibia) 12.5 mm. (note: right tibia broken off, left tibia not subdivided), (basitarsus) 6.3 mm., (tarsus) first segment 1.8 mm., second segment 0.8 mm., fourth segment 1.0 mm.

ABDOMEN. Dorsal surface with lighter areas around muscular impressions. Measurements. Length 12.5 mm. *Genital operculum*: length 3.0 mm., width 5.5 mm. Female genitalia (fig. 33b) and male genitalia (fig. 33c) as illustrated.

TYPE DATA. Paratype: female, from Oaxaca, Mexico. According to Pocock's original description, this paratype appears to be the specimen mentioned in the last paragraph with "...the curious anomaly...of having the posterior tibia on one side undivided and on the other divided into only two segments..." Another specimen labeled as paratype is from "Mexico, probably Puebla." However it is different from the paratype described herein. It is identical with the Arizona form of *P. mexicanus*. Both paratypes are deposited in the British Museum (Natural History). The holotype appears to be lost.

DISTRIBUTION. (Figure 39). The Isthmus form occurs in the Mexican states of Chiapas, Tabasco, Oaxaca, and Vera Cruz. The Atoyac form occurs farther north in Vera Cruz with records around Cordoba.

FORMS. Two distinct forms are recognized, an Isthmus form and Atoyac form. The paratype of *P. asteca* resembles the Isthmus form. This form has shorter spines and legs (length of femur IV not exceeding width of carapace) and in most cases can be readily distinguished from the Atoyac form which has longer spines and legs (length of femur IV exceeding width of carapace by at least 1.0 mm.). Other differences occur but they seem more variable. One of these is the comparative lengths of tr-IV and tr-I. The Isthmus form may have tr-IV very short, ranging in length from a minute spine to just greater than half the length of tr-I (as in paratype). The Atoyac form has tr-IV always greater than half the length of tr-I and in most cases only slightly shorter than this spine.

RECORDS. *Isthmus form*: MEXICO. *Chiapas*: Cueva cerro Hueco, 3 km. SE. Tuxtla Guitierrez, 18 August 1967, J. Reddell, J. Fish, M. Tandy, 2 females (AMNH). *Oaxaca*: Palomares, Isthmus of Tehuantepec, 24 July 1909, A. Petrunkevitch, 3 females, 2 males (AMNH). *Tabasco*: Comalcalco archaeological site, 2 km. NE. of Comalcalco, February-May 1956, G. Ekholm, 2 males, 2 females (AMNH). *Vera Cruz*: 30 km. S. of Jesus Carranza, 8 October 1939, Bogert and Vokes, 1 male, 1 female (AMNH); Hacienda la Oaxaquena, 10 km. S. of Jesus Carranza, Bogert and Vokes, 2 females (AMNH); La Buena Ventura, near Santa Rosa, Isthmus of

Tehuantepec, 17 July 1909, A. Petrunkevitch, 5 females, 3 males (AMNH); La Buena Ventura, 22 January 1909, A. Petrunkevitch, 1 male (AMNH); La Buena Ventura, near Santa Rosa, Isthmus of Tehuantepec, 20 July 1909, A. Petrunkevitch, 3 females (AMNH).

Atoyac form: MEXICO. *Vera Cruz*: Atoyac, N. Banks, 1 undetermined sex (MCZ); Grutas de Atoyac, 2 km. east of Atoyac, 22 August 1965, J. Reddell, J. Fish, W. Bell, 2 females, 1 male (AMNH); cave at origin of Rio Atoyac, near Cordoba, 13 August 1965, C. L. Hogue, 1 male (LACMNH); Cueva de Sala de Agua Grande, 6 mi. E. Yanga, 9 August 1967, J. Reddell, J. Fish, T. Evans, 5 males, 3 females (AMNH); Cueva de Ojo de Agua Grande, 8 km. NW. Paraje Nuevo, 3 August 1967, J. Reddell, J. Fish, T. Evans, 1 male (AMNH); Cueva de Ojo de Agua de Tlilipan, Tlilipan, 4 August 1967, J. Reddell, J. Fish, and T. R. Evans, 1 female (AMNH).

Paraphrynus intermedius (Franganillo), new combination.

Hemiphrynus intermedius Franganillo, 1926, p. 67.

The holotype of *P. intermedius* has not been examined. Franganillo's collection is deposited in the Academia de Ciencias de Cuba, La Habana, but the catalogue to his specimens is lost. Since the specimens are labeled with numbers only, it is impossible to determine which specimen is the holotype. For this reason, and since Franganillo's description is brief and does not give the salient characteristics, the species cannot be clearly defined. In his description, Franganillo discusses 3 characters. One is the comparative lengths of Bd-I and Bd-III. In *P. intermedius*, Bd-I is longer than Bd-III. This is in contrast to the other Cuban species *P. astes* and *P. viridiceps* which have Bd-I shorter than Bd-III. Franganillo then discusses the presence of what Pocock termed a longitudinal crest on the inferior surface of the pedipalp tibia. On this basis he relates *P. intermedius* to *P. raptator* and *P. laevifrons*. Originally I considered that the Cuban form of *P. mexicanus* might be *P. intermedius* on the basis that Bd-I is longer than Bd-III. However, this form does not have the longitudinal crest. Franganillo then distinguishes *P. intermedius* from *P. raptator* on the basis of the presence of 6 spines on the inner lateral surface of the pedipalp trochanter in *P. intermedius* as opposed to 4 in *P. raptator*.

Paraphrynus fuscimanus (Koch), *nomen dubium*.

Phrynus fuscimanus Koch, 1848, p. 67.

Admetus fuscimanus (Koch), 1850, p. 81.

Neophrynus fuscimanus; Kraepelin, 1895, p. 25-28.

Tarantula fuscimanus; Kraepelin, 1899, p. 243.

Hemiphrynus fuscimanus; Mello-Leitão, 1931, p. 45.

Efforts to locate the holotype of *P. fuscimanus* have been unsuccessful. According to the original description, C. L. Koch received his specimen from J. Sturm, who received it from Duke Paul of Württemberg. The type-depository was not stated in publication. Assuming that the specimen was kept in the Koch collection, it was thought to be located in either the British Museum or Humboldt University, the institutions where Koch's collection was deposited. However, neither of the institutions claim to know of it. The next assumption was that it remained in the Sturm collection. Apparently part of the Sturm collection was deposited in the museum at Munich (Zoologische Staatssammlung). However, neither of the two specimens in this museum determined as *P. fuscimanus* is the holotype. It seems that Kraepelin was the last worker to examine type-specimen as evidenced in his 1895 publication. Assuming that this was the case, it is possible that it remained in the Zoologisches Institut, Hamburg, where he worked. However this museum does not possess the specimen either. As a result of these inquiries, the holotype is assumed to be lost or deposited in another museum.

Koch's original description and Kraepelin's redescription are of no use in identifying any specimens as *P. fuscimanus*. Koch's description is much too general even to take the species to the first step in the key to *Paraphrynus*. The type-locality was published simply as "Nordamerika." This could also include Mexico.

Kraepelin's redescription of the holotype is likewise not useful. However, he does mention the comparative lengths of the first and third spines on the dorsal surface of the pedipalp basitarsus. This character is used in the first step of the key to *Paraphrynus*. Apparently the holotype of *P. fuscimanus* is an aberrant; the first spine is longer than the third on one basitarsus while the situation is reversed on the other. Again this prevents one from taking it to the first step in the key. If this were possible, a number of species could be eliminated as possible synonyms of *P. fuscimanus*.

Since the holotype has not been located and since it is impossible to determine from the descriptions what specimens could be this species, the name is regarded as a *nomen dubium*. It is hoped that the holotype will be found eventually. If it is, it is expected that one of the described species of *Paraphrynus* may become a synonym of *P. fuscimanus*.

DISCUSSION AND CONCLUSIONS

Two species originally described under *Hemiphrynus* appear to have been erroneously placed in this category. Although the types have not been examined for this study, the descriptions and illustrations suggest that they do not belong to this genus. One species is *Hemiphrynus corderoi* Mello-Leitao (1946). According to the description and illustration of the dorsal tibial spines of the pedipalp, this species has one spine between the two longest and therefore should have been placed in *Phrynus*. The other species, *Hemiphrynus machadoi* Fage (1952), from Africa, should be placed in a new genus as suggested by Fage (1952) and Lawrence (1967). It has a number of characters that are quite different from *Hemiphrynus*. The holotype was collected in Angola and was apparently placed in *Hemiphrynus* on the basis that there are two spines between the two longest dorsal tibial spines of the pedipalp. However, of these two spines, the proximal is shortest while the distal is longest. This condition is reversed in all other species of *Paraphrynus*. The African species is also unique in having a basitarsal spur which projects over the first tarsomere, a character not found in the other species of *Paraphrynus*. Fage noted these differences and suggested that they might be generically significant. However, he refrained from placing the species in a new genus since the type specimen is immature. Later, Lawrence (1967) figured and described a larger specimen from South West Africa. He illustrated the sternum and male genitalia, and also noted that it might be generically different and suggested a new generic name to be used if his conclusions were right.

The genus *Paraphrynus* can be divided into three groups; the *laevifrons*, *azteca*, and *raptator* groups. The *laevifrons* group has Bd-I shorter than Bd-III, while species of the *azteca* and *raptator* groups have Bd-I longer than Bd-III. Furthermore, the *laevifrons* group has Td-VII longer in comparison with Td-VIII and IX, so that the difference between lengths of Td-VII and VIII is much greater than the difference between Td-VIII and IX. As a result Td-VII is always as long as or generally longer than Td-II. There are three species in this group which can be separated into two subgroups. The two West Indian species, *P. astes* and *P. viridiceps*, are characterized by having Bv-III shorter than Bd-I, and by the presence of three teeth on the outer edge of the anteroventral surface of the basal cheliceral segment. In contrast, *P. laevifrons* has Bv-III longer than Bd-I and has no more than two teeth on the outer edge of the basal cheliceral segment. This species is found in Central America ranging from Panama to El Salvador.

Those species of the *azteca* and *raptator* groups have Td-VII short in comparison with Td-VIII and IX, so that the difference between lengths of Td-VII and VIII is not conspicuously greater than the difference between Td-VIII and IX. As a result Td-VII is generally shorter than Td-II.

The *azteca* and *raptator* groups can be distinguished from each other as indicated in couplet two of the species key to *Paraphrynus*. The *raptator* group is comprised of those species falling into the first part of the couplet. The minute spine located on the pedipalp tarsus appears to be always accompanied by a short Fv-III on the same animal. The combination of these two characters is considered reliable in separating this group of species from the *azteca* group which has a longer Fv-III and does not possess the minute spine.

Some species of the *raptator* group have two characteristics that, previous to this study, were thought to be restricted to the Charontidae. One character is the presence of the above mentioned minute spine on the pedipalp tarsus (fig. 8h). Species of Charontidae apparently possess such spinal processes on the same segment. These are, at times, quite well developed. The second character is the presence of a suture separating the tarsus and post-tarsus of the pedipalp. While this suture is common in the charontids, most species of the other two families have these two segments fused. However this study has revealed exceptions in four species of the *raptator* group (*P. macrops*, *P. emaciatus*, *P. williamsi*, and *P. leptus*) and in *P. velmae*. Movement of these two segments in relation to each other as a result of the articulation seems very slight in any of the species of *Paraphrynus*. In *P. macrops* the segments are immobile, while in *P. velmae* they appear to move slightly.

Superficially, sexual dimorphism is inconspicuous in *Paraphrynus*. The males have pedipalp segments slightly longer and more slender than females. The size and shape of the genital operculum also vary according to sex; the operculum in the males is larger and more rounded on the posterior edge, while in the females the operculum is smaller and its posterior edge more straight. Male and female genitalia have not been used to distinguish the species. Some differences can however be noted in the illustrations (figs. 11b, 16b, 20e, 30b, 31b, 33b, c).

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Thanks go to the following people of the California Academy of Sciences: George E. Lindsay who helped support field work in Chiapas, Mexico through an American Association for the Advancement of Science student research grant; Dennis E. Breedlove whose hospitality in Chiapas made field work possible; and Paul H. Arnaud, Jr. for use of laboratory facilities in the Department of Entomology. My thanks and appreciation also go to the following individuals and their institutions for loan of specimens: K. H. Hyatt, British Museum (Natural History) (BMNH) for loan of type specimens; P. H. Arnaud, Jr., California Academy of Sciences (CAS); M. M. Bentzien, University of California, Berkeley (UCB); G. W. Byers, University of Kansas (UK); J. A. L. Cooke,

American Museum Natural History (AMNH); H. Fechter, Zoologische Staatssammlung, München (ZSM); S. Frommer, University of California, Riverside (UCR); J. Grüber, Naturhistorisches Museum, Wien (NMW); C. L. Hogue, Los Angeles County Museum of Natural History (LACMNH); H. W. Levi, Museum of Comparative Zoology, Harvard University (MCZ); C. A. Triplehorn, Ohio State University (OSU); and H. V. Weems, Jr., Florida Department of Agriculture and Consumer Services (FDA). Further appreciation goes to the following people for loan of specimens from their personal collections: T. S. Briggs (TSB), V. F. Lee (VFL), K. E. Lucas (KEL), R. E. Main (REM), B. R. Vogel (BRV), and S. C. Williams (SCW). I would also like to thank D. E. Breedlove, L. Hallacher, V. F. Lee, and K. E. Lucas for collecting amblypygids for me. In addition the following people are gratefully acknowledged for their help: Stanley C. Williams, James R. Sweeney, and Harry D. Thiers for critical reading of the manuscript, as well as Robert X. Schick, John T. Hjelle, and Vincent F. Lee for their help on certain problems; John T. Hjelle for photographs; and Lillian J. Dempster and W. I. Follett for suggestions regarding nomenclature. Finally, the enthusiastic aid and advice of Stanley C. Williams is deeply appreciated.

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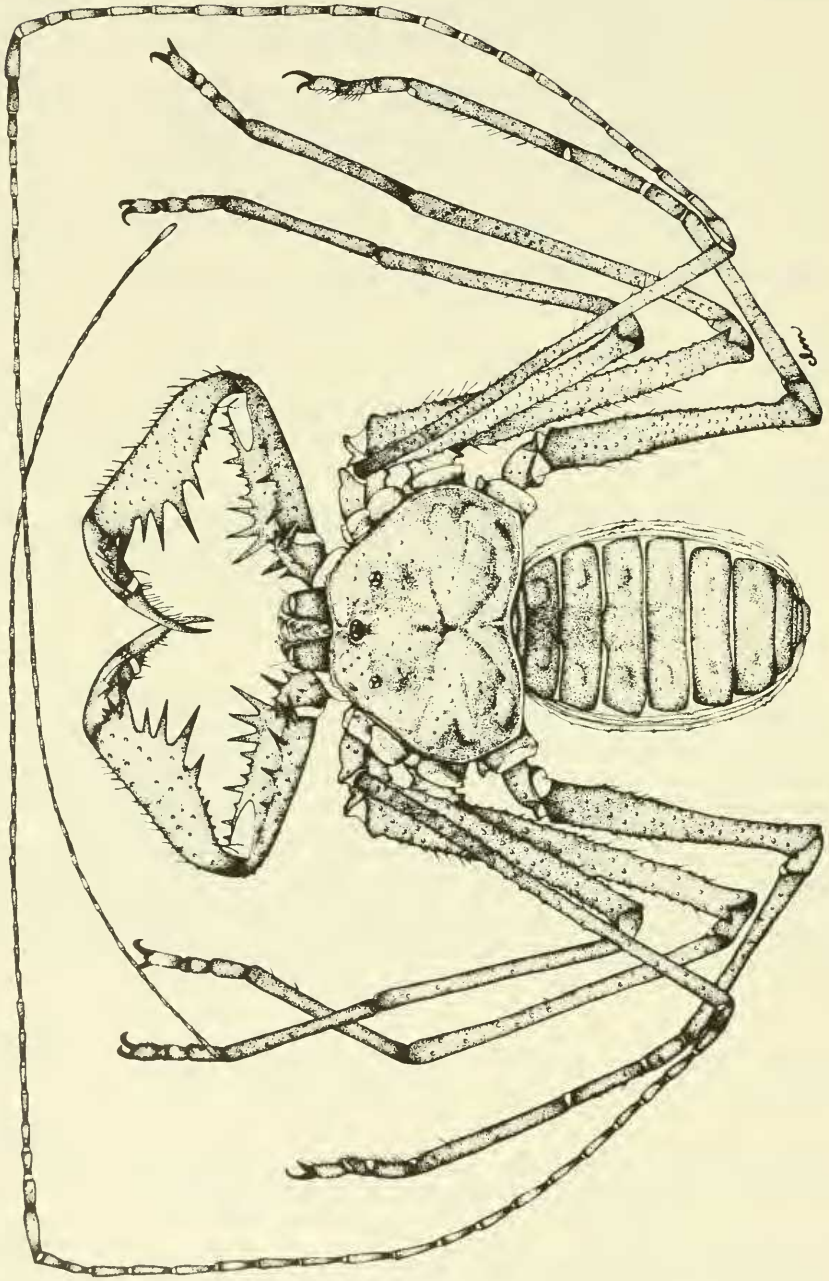
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ADDENDUM

While this paper was in press, an article was brought to my attention entitled "Two new troglobitic Amblypygida of the genus *Tarantula* from Mexican Caves (Arachnida)" by J. Mark Rowland (Association for Mexican Cave Studies, Bulletin 5, 1973). The two species, *T. chixtun* and *T. chaemool*, belong to *Paraphrynus* and are similar to *P. baeops* in having the median ocular area concolorous with the rest of the carapace and the two median eyes reduced in size. In my key to species, *T. chaemool* would key out to *P. raptator* and *T. chixtun* to *P. baeops*.



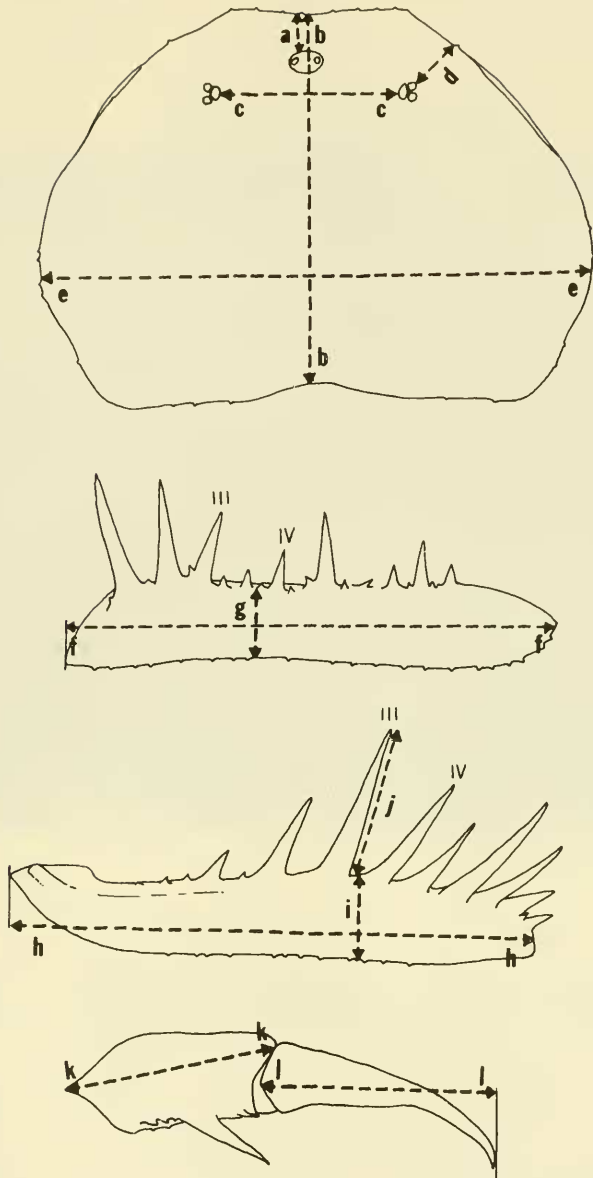
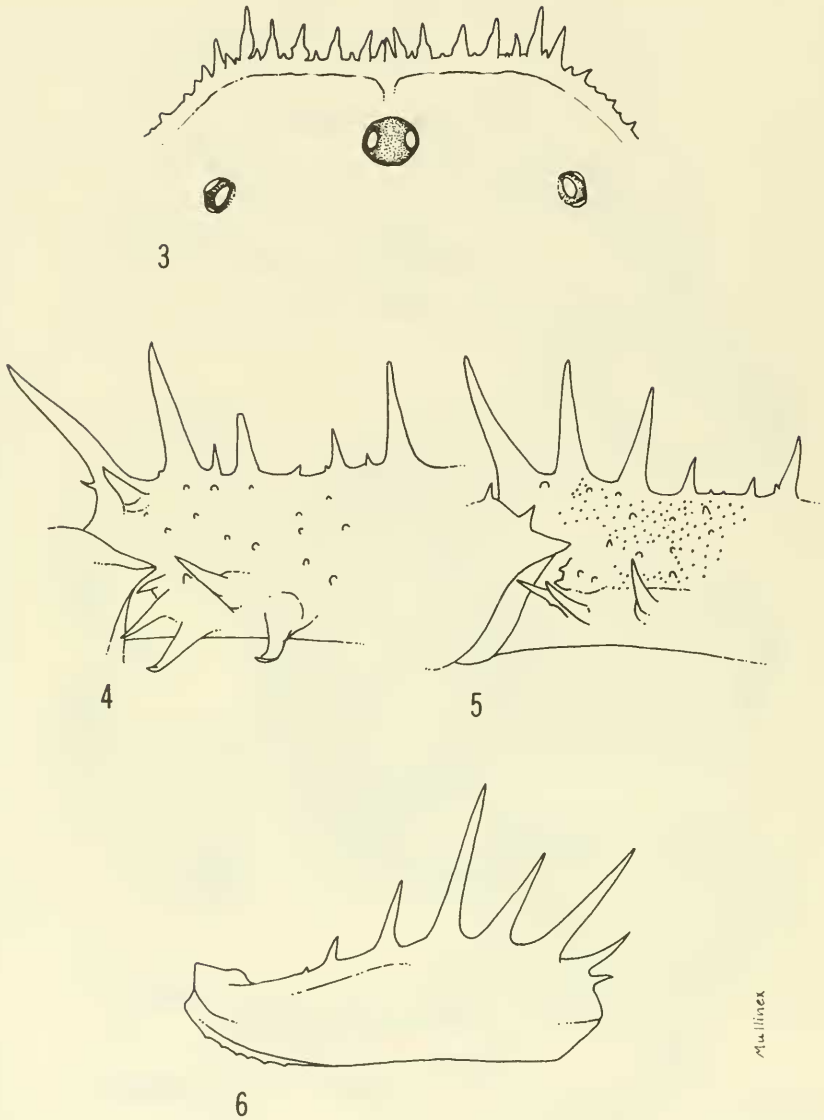


FIGURE 2. Measurements taken; a. Distance of median ocular tubercle from anterior edge. b. Length of carapace. c. Distance of lateral eyes from each other. d. Distance of lateral eyes from lateral edge. e. Width of carapace. f. Length of femur. g. Width of femur. h. Length of tibia. i. Width of tibia. j. Length of Td-III. k. Length of pedipalp basitarsus. l. Length of pedipalp tarsus.

← FIGURE 1. *Paraphrynus mexicanus* (Bilimek), dorsal view of Arizonan form from Phoenix, Arizona.



Mullineux

FIGURES 3-6. FIGURE 3. *Acanthophrinus*, showing serrate margin of anterior edge of carapace. FIGURE 4. *Acanthophrinus*, pedipalp femur, inner lateral view showing two spines projecting at proximal end. FIGURE 5. *Paraphrinus*, pedipalp femur, proximal end, showing absence of spines projecting from inner lateral surface. FIGURE 6. *Phrinus*, pedipalp tibia, dorsal view, showing presence of one spine between two longest spines.

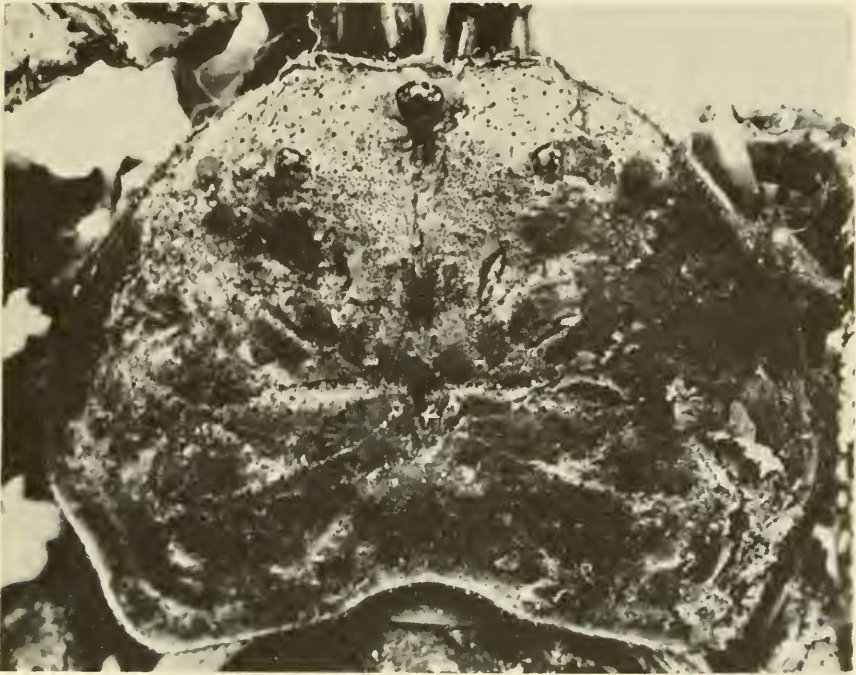


FIGURE 7. *Paraphrynus raptator* (Pocock), holotype (male), carapace.

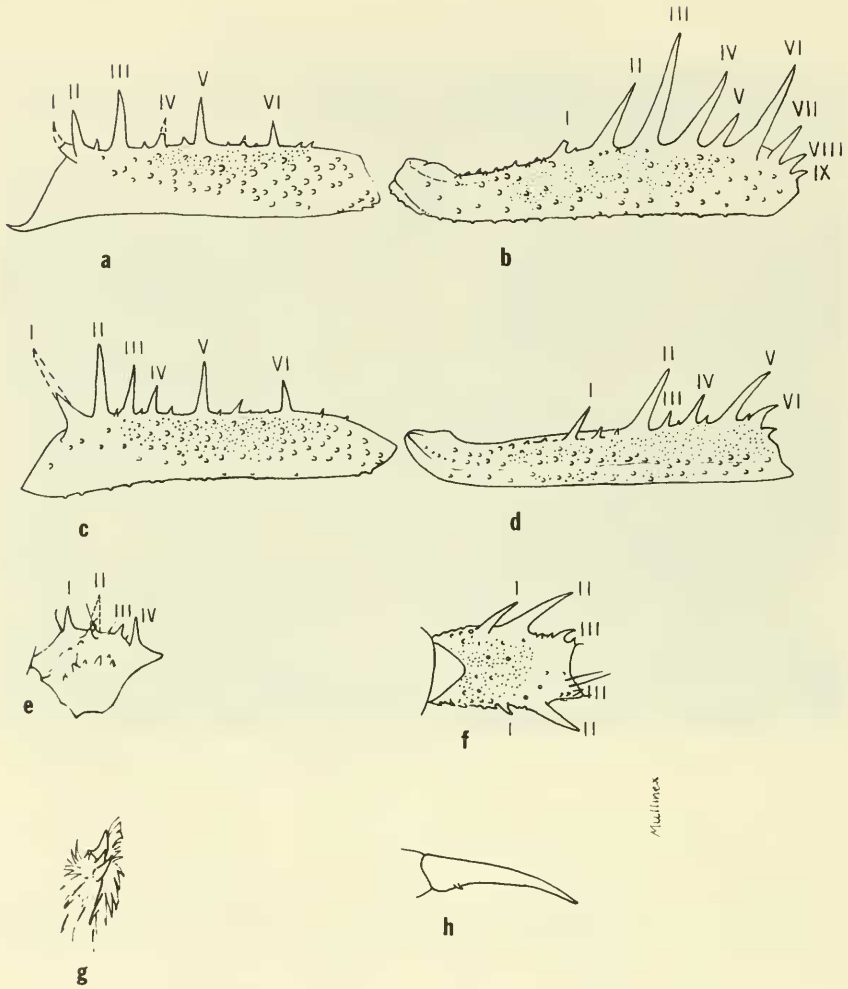


FIGURE 8. *Paraphrynus raptator* (Pocock), holotype (male). a. Pedipalp femur, dorsal view. b. Pedipalp tibia, dorsal view. c. Pedipalp femur, ventral view. d. Pedipalp tibia, ventral view. e. Pedipalp trochanter, dorso-inner lateral view. f. Pedipalp basitarsus, inner lateral view. g. Chelicera, anteroventral view of basal segment. h. Pedipalp tarsus, dorsal view.

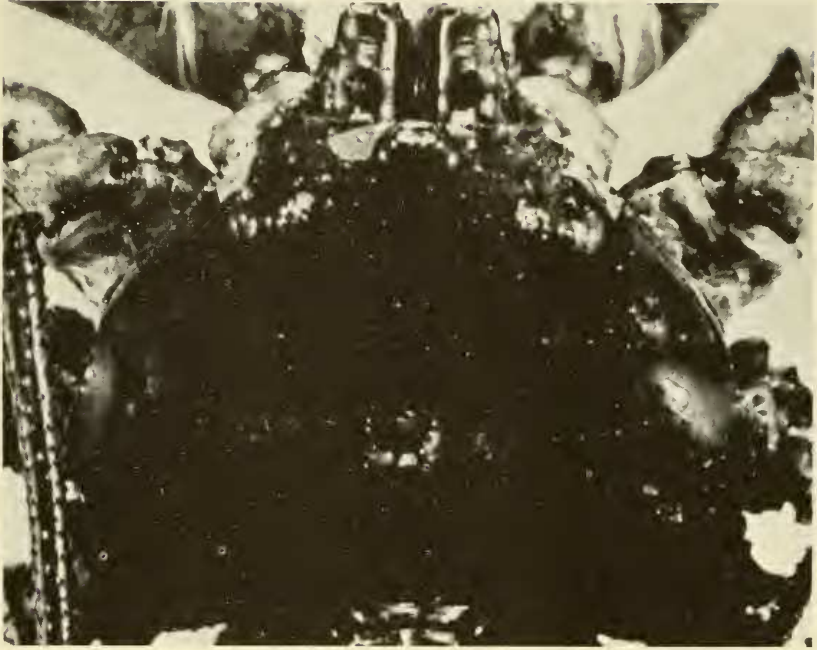


FIGURE 9. *Paraphrynus macrops* (Pocock), holotype (female). Carapace, showing large median ocular tubercle set close to anterior edge.

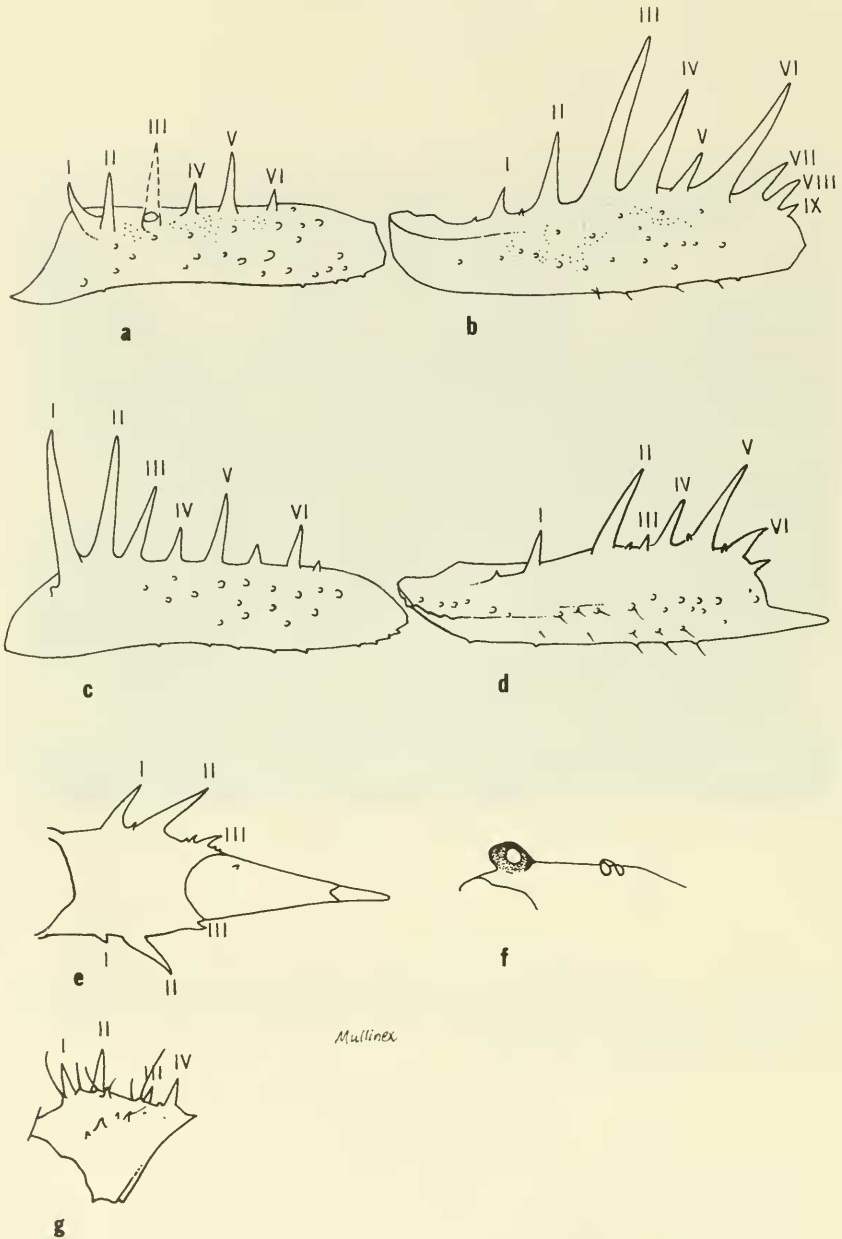


FIGURE 10. *Paraphrynus macrops* (Pocock), holotype (female). a. Pedipalp femur, dorsal view. b. Pedipalp tibia, dorsal view. c. Pedipalp femur, ventral view. d. Pedipalp tibia, ventral view. e. Pedipalp basitarsus and tarsus, inner lateral view. f. Anterior edge of carapace, lateral view. g. Pedipalp trochanter, dorso-inner lateral view.

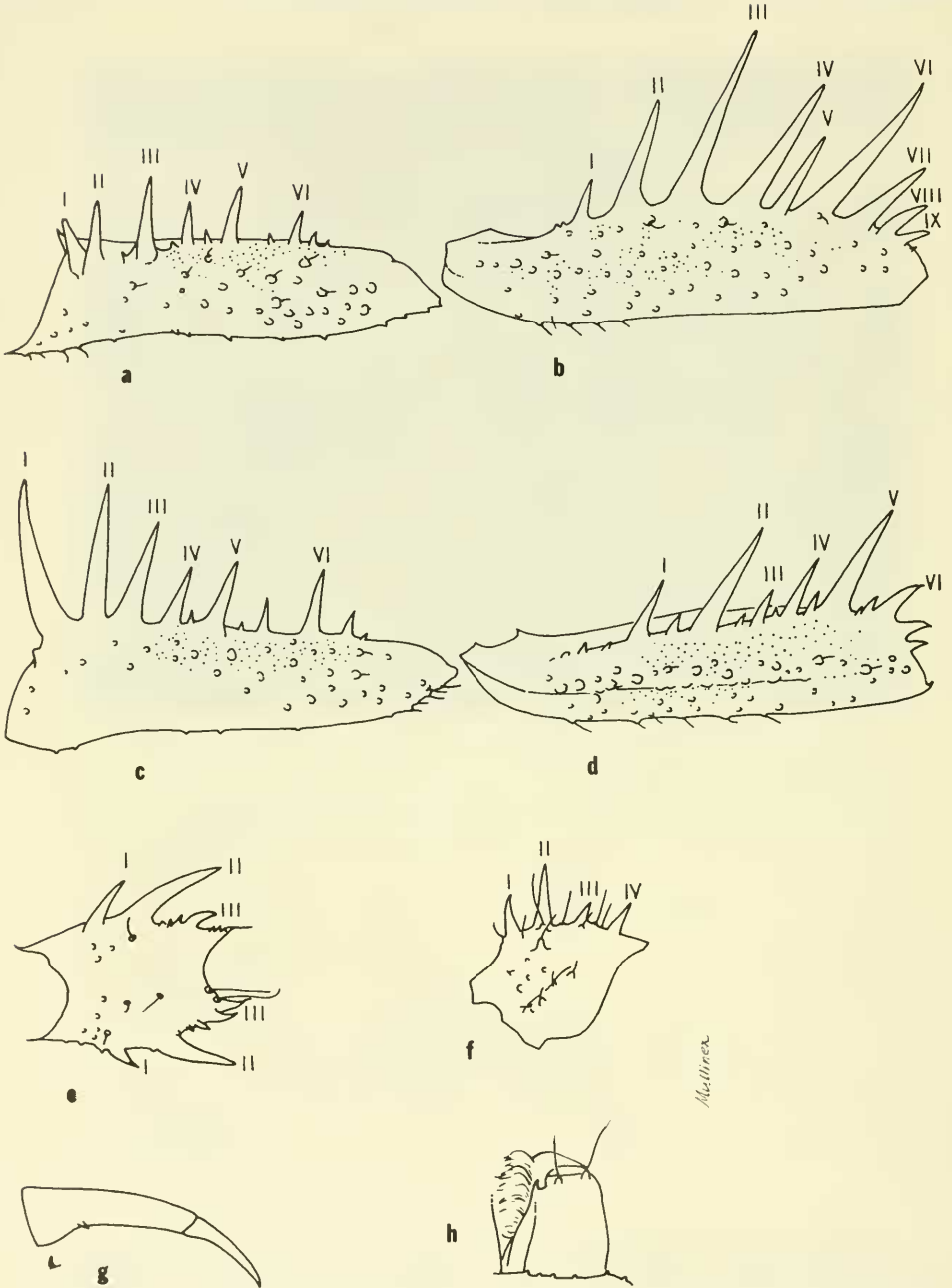


a



b

FIGURE 11. *Paraphrynus williamsi* Mullinex. a. Carapace of holotype (female). b. Genitalia of female paratype.



Mullinex

FIGURE 12. *Paraphrynus williamsi* Mullinex, holotype (female). a. Pedipalp femur, dorsal view. b. Pedipalp tibia, dorsal view. c. Pedipalp femur, ventral view. d. Pedipalp tibia, ventral view. e. Pedipalp basitarsus, inner lateral view. f. Pedipalp trochanter, dorso-inner lateral view. g. Pedipalp tarsus and post-tarsus, dorsal view, showing small spine on proximal end of tarsus and suture separating this segment from post-tarsus. h. Chelicera, dorsal view of basal segment, showing tubercles on anterior edge.

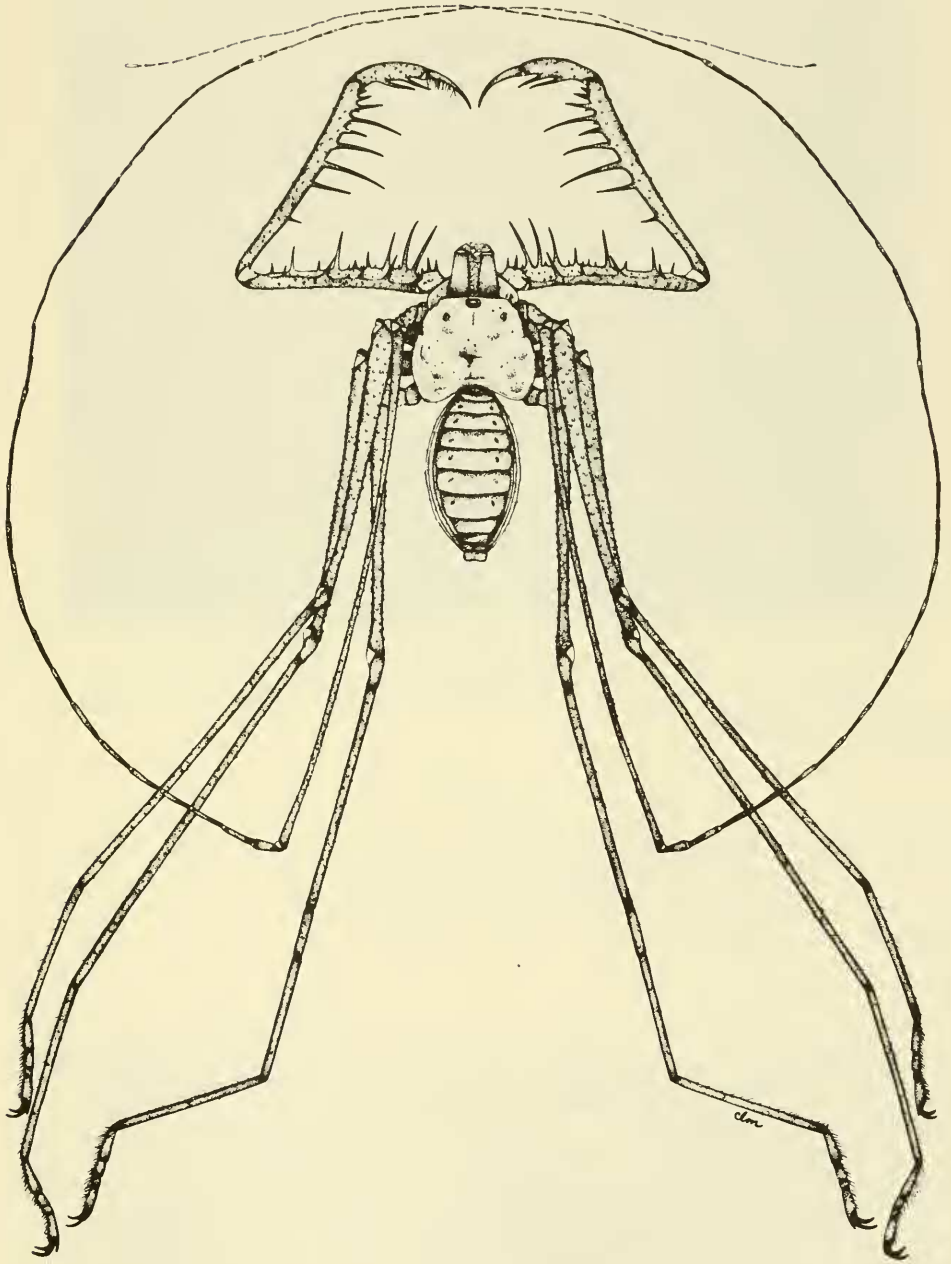
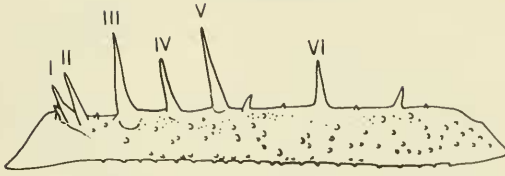


FIGURE 13. *Paraphrynus emaciatus* Mullinex, holotype (male), dorsal view.

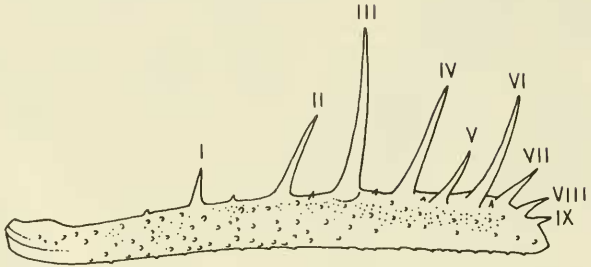


FIGURE 14. *Paraphrynus emaciatus* Mullinex, holotype (male), carapace.

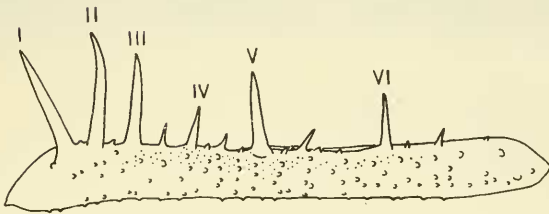
FIGURE 15. *Paraphrynus emaciatus* Mullinex, holotype (male). a. Pedipalp femur, dorsal view. b. Pedipalp tibia, dorsal view. c. Pedipalp femur, ventral view. d. Pedipalp tibia, ventral view. e. Pedipalp basitarsus, inner lateral view. f. Pedipalp tarsus and post-tarsus, dorsal view, showing small spine on tarsus and suture separating this segment from post-tarsus. g. Chelicera, anteroventral view of basal segment. h. Pedipalp trochanter, dorso-inner lateral view. →



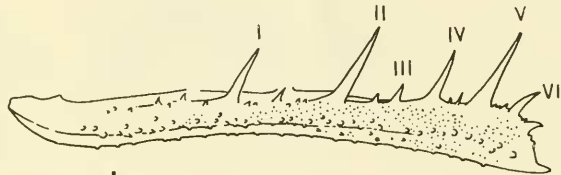
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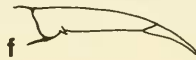
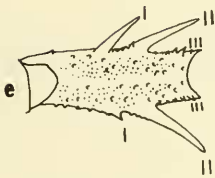
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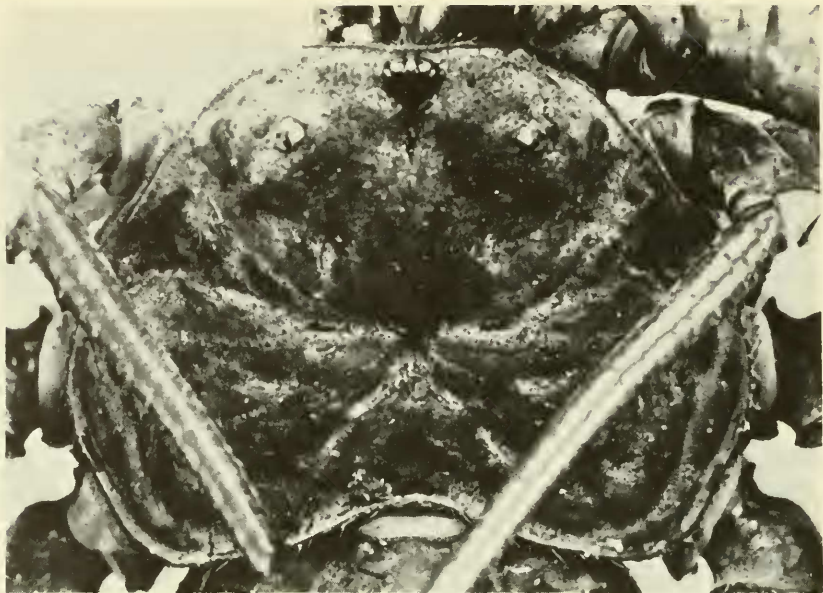


d



Mullinex

h

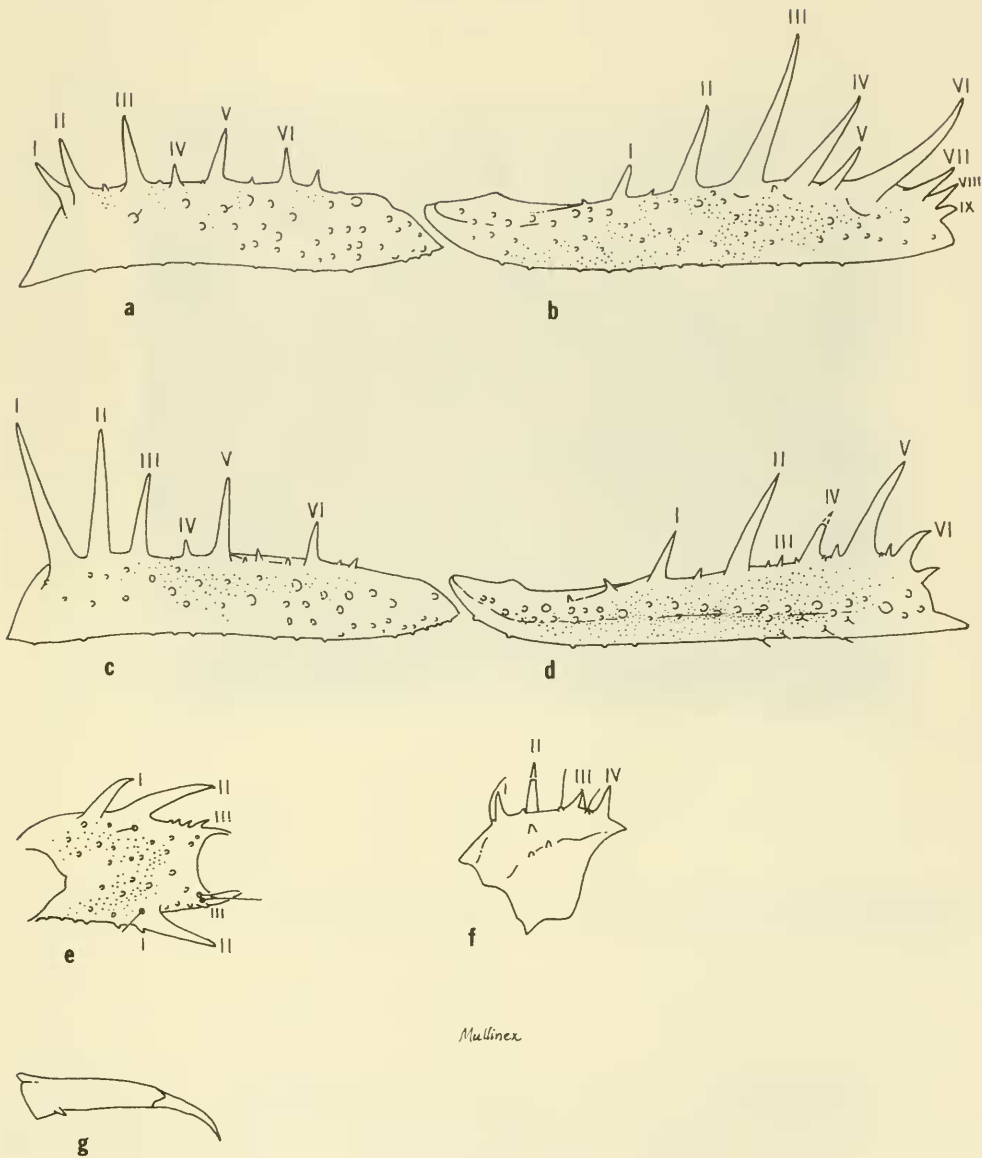


a



b

FIGURE 16. *Paraphrynus leptus* Mullinex. a. Carapace of holotype (male). b. Genitalia of allotype (female).



Mullinex

FIGURE 17. *Paraphrynus leptus* Mullinex, holotype (male).
 a. Pedipalp femur, dorsal view. b. Pedipalp tibia, dorsal view. c. Pedipalp femur, ventral view. d. Pedipalp tibia, ventral view. e. Pedipalp basitarsus, inner lateral view. f. Pedipalp trochanter, dorso-inner lateral view. g. Pedipalp tarsus and post-tarsus, dorsal view, showing small spine on tarsus and suture separating this segment from post-tarsus.

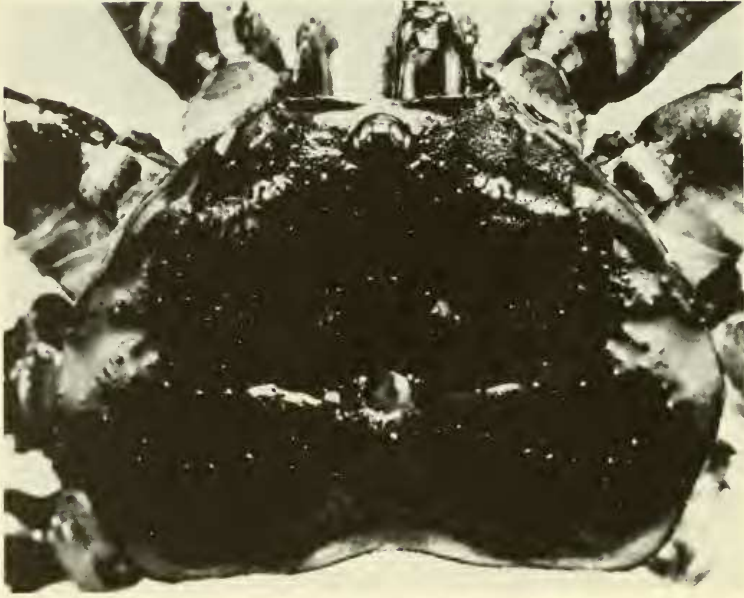


FIGURE 18. *Paraphrynus laevifrons* (Pocock), holotype (female), carapace.

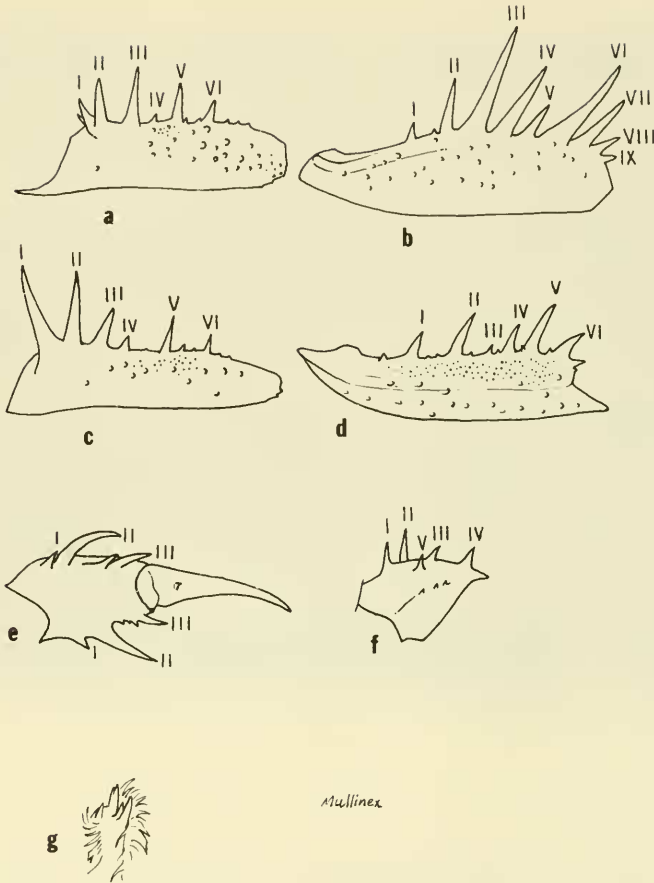


FIGURE 19. *Paraphrynus laevifrons* (Pocock), holotype (female). a. Pedipalp femur, dorsal view. b. Pedipalp tibia, dorsal view. c. Pedipalp femur, ventral view, showing Fv-III conspicuously shorter than Fv-II. d. Pedipalp tibia, ventral view. e. Pedipalp basitarsus and tarsus, inner lateral view. f. Pedipalp trochanter, dorso-inner lateral view showing fifth spine (tr-V). g. Chelicera, anteroventral view of basal segment, showing one tooth on outer edge (at left side of drawing).

Mullinex

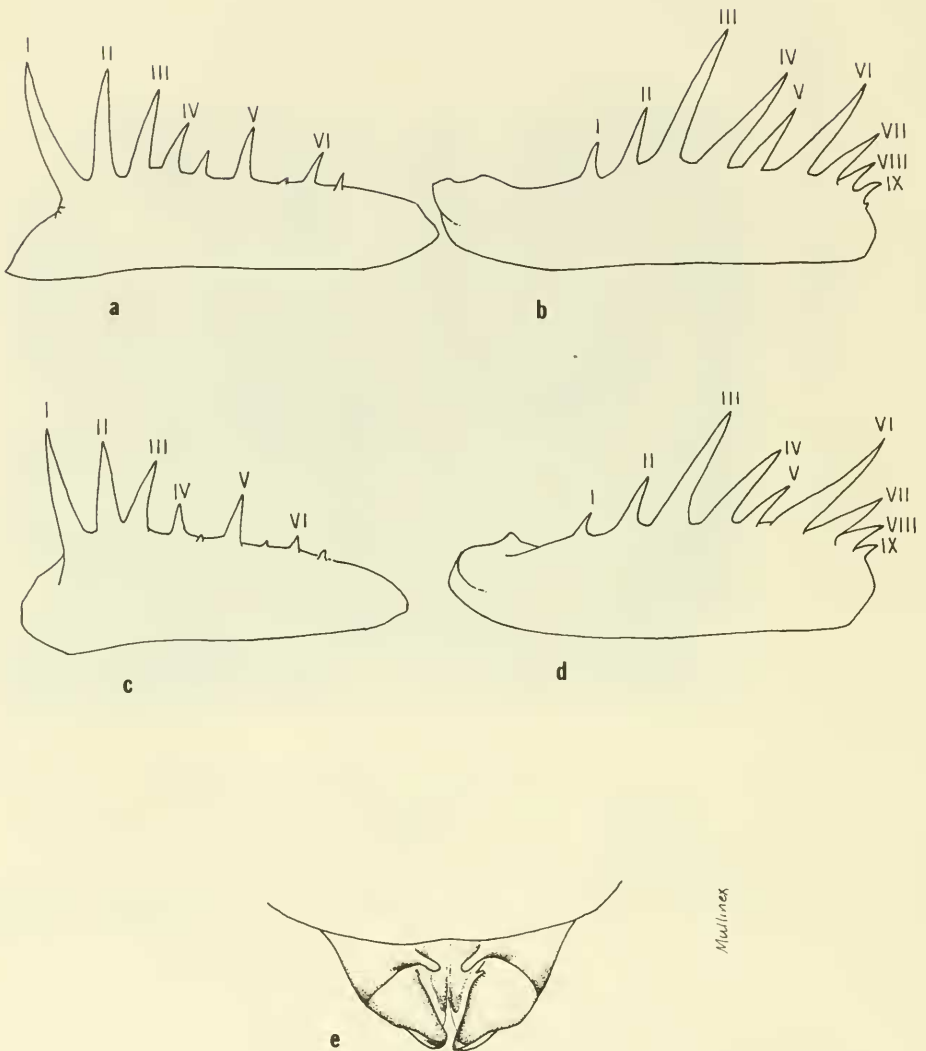
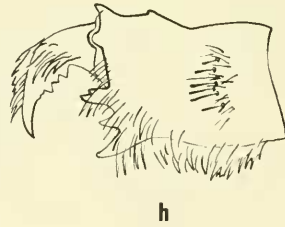
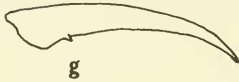
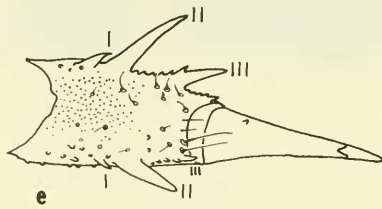
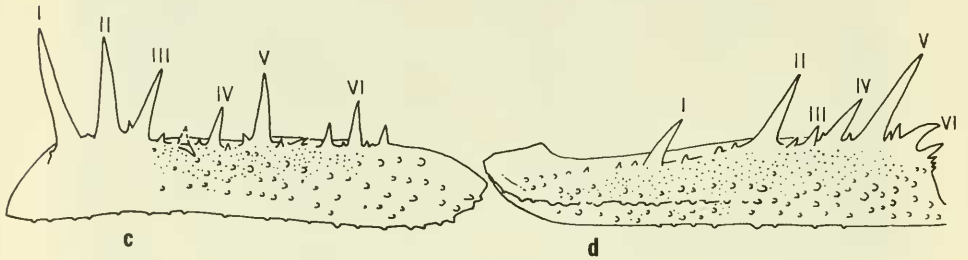
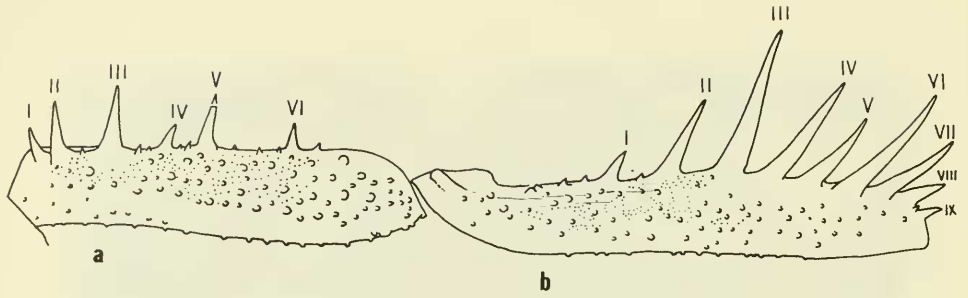


FIGURE 20. Three forms of *Paraphrynus laevifrons* (Pocock). a. Grutas del Venado form, pedipalp femur, ventral view showing Fv-III slightly shorter than Fv-II. b. Grutas del Venado form, pedipalp tibia, dorsal view, showing Td-II shorter than Td-V. c. Guanacaste form, pedipalp tibia, dorsal view showing Td-II and V about equal in length. d. Panamanian form, pedipalp tibia, dorsal view showing Td-II and V about equal in length. e. Panamanian form, male genitalia, ventral view.



FIGURE 21. *Paraphrynus astes* Mullinex, holotype (male), carapace.



Mullines



FIGURE 23. *Paraphrynus viridiceps* (Pocock), holotype (male), carapace.

← FIGURE 22. *Paraphrynus astes* Mullinex, holotype (male).
 a. Pedipalp femur, dorsal view. b. Pedipalp tibia, dorsal view.
 c. Pedipalp femur, ventral view. d. Pedipalp tibia, ventral view.
 e. Pedipalp basitarsus and tarsus, inner lateral view showing inner lateral suture separating tarsal and post-tarsal areas. f. Pedipalp trochanter, dorso-inner lateral view.
 g. Pedipalp tarsus, dorsal view showing small spine on proximal end and absence of suture separating tarsal and post-tarsal areas on this surface. h. Chelicera, basal segment, inner lateral view showing clavate setae.
 i. Chelicera, basal segment, anteroventral view showing three teeth on outer edge (at left side of drawing).

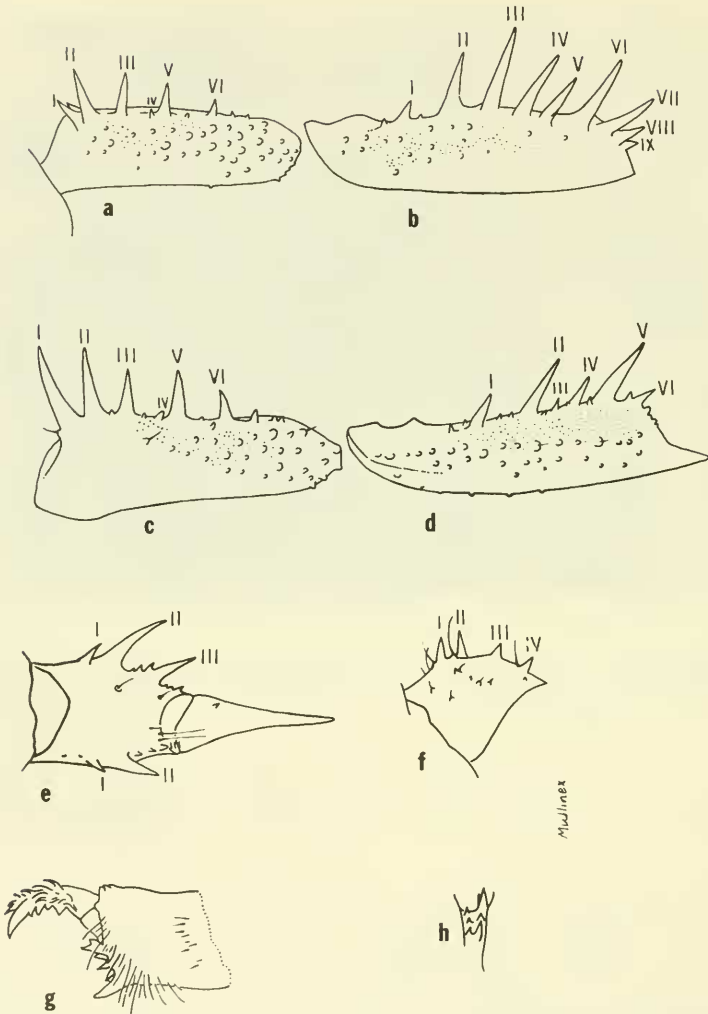


FIGURE 24. *Paraphrynus viridiceps* (Pocock), holotype (male). a. Pedipalp femur, dorsal view. b. Pedipalp tibia, dorsal view. c. Pedipalp femur, ventral view. d. Pedipalp tibia, ventral view. e. Pedipalp basitarsus and tarsus. f. Pedipalp trochanter, dorso-inner lateral view. g. Chelicera, inner lateral view showing acuminate setae. h. Chelicera, anteroventral view, showing three teeth on outer edge (at left side of drawing).

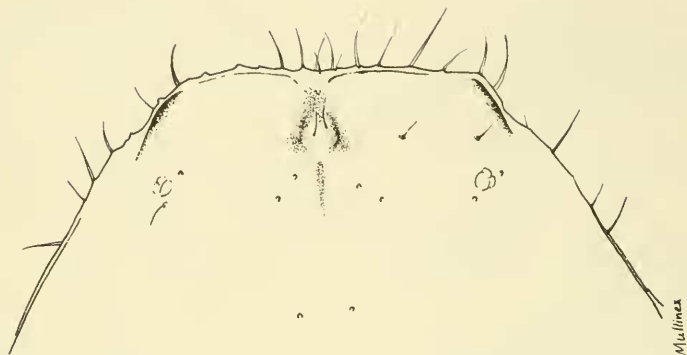
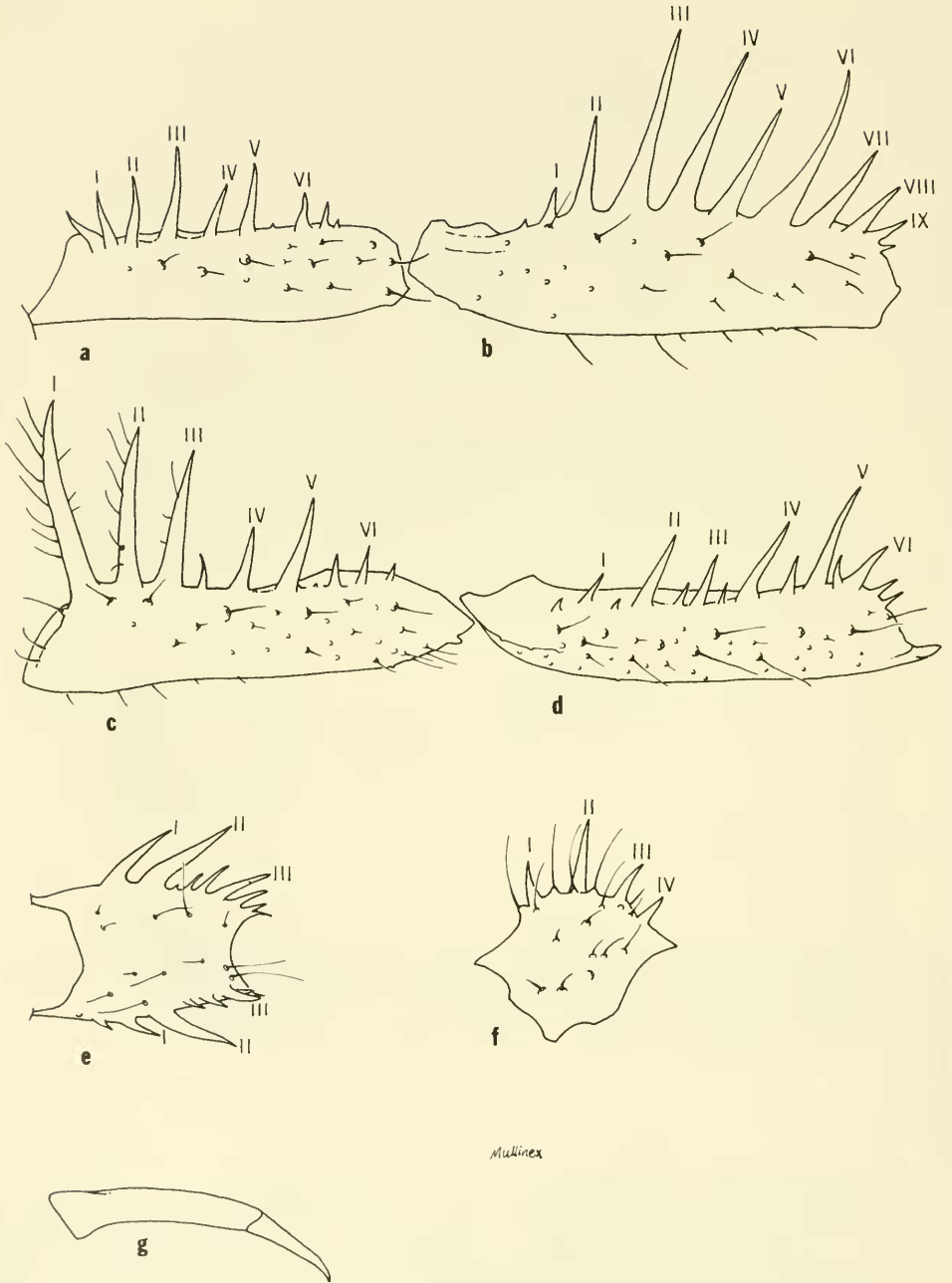


FIGURE 25. *Paraphrynus velmae* Mullinex, holotype (female), carapace, showing absence of median ocular tubercle and median pair of eyes. (Fine granulation omitted).



Mullinex

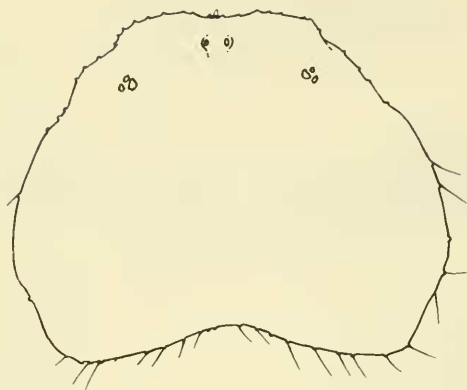


FIGURE 27. *Paraphrynus baeops* Mullinex, holotype (male), carapace, showing absence of darkly pigmented median ocular tubercle and presence of two small median eyes. (Coarse and fine granulation omitted).

← FIGURE 26. *Paraphrynus velmae* Mullinex, holotype (female). a. Pedipalp femur, dorsal view. b. Pedipalp tibia, dorsal view. c. Pedipalp femur, ventral view. d. Pedipalp tibia, ventral view. e. Pedipalp basitarsus, inner lateral view. f. Pedipalp trochanter, dorso-inner lateral view. g. Pedipalp tarsus and post-tarsus showing suture separating them.

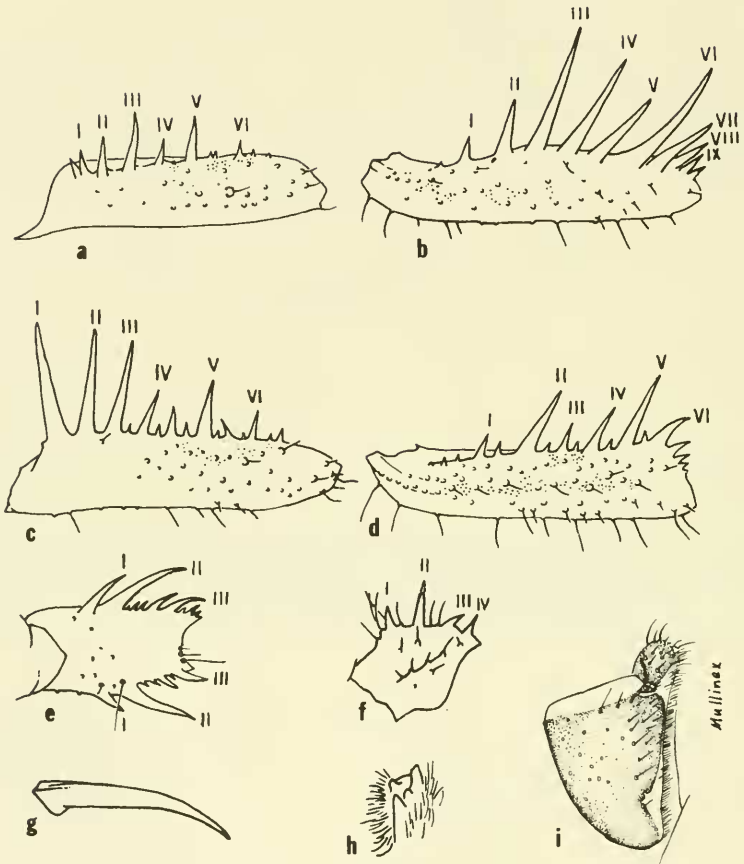


FIGURE 28. *Paraphrynus baeops* Mullinex, holotype (male). a. Pedipalp femur, dorsal view. b. Pedipalp tibia, dorsal view. c. Pedipalp femur, ventral view. d. Pedipalp tibia, ventral view. e. Pedipalp basitarsus, inner lateral view. f. Pedipalp trochanter, dorso-inner lateral view. g. Pedipalp tarsus, dorsal view. h. Basal segment of right chelicera, anteroventral view showing one tooth on outer edge. i. Gnathocoxa, ventral view showing mesal narrow area of white.

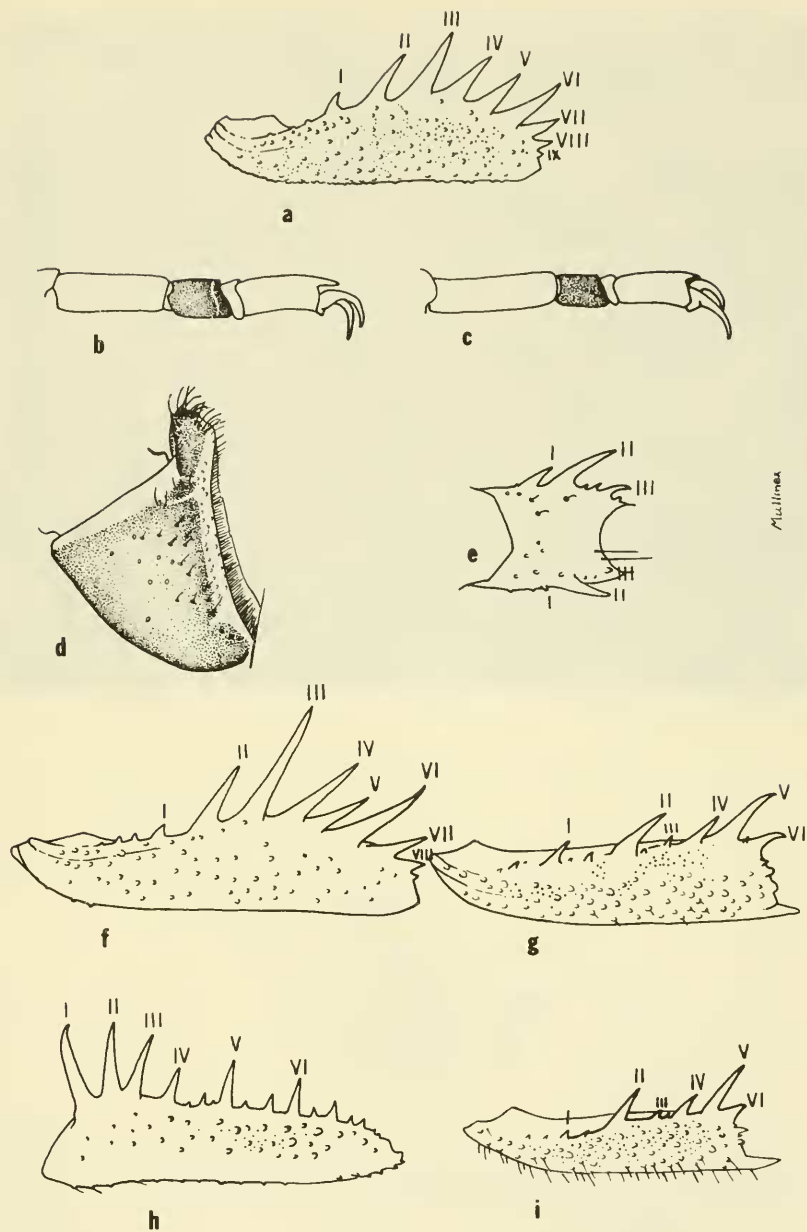
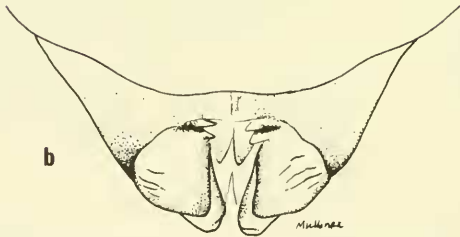


FIGURE 29. *Paraphrynus mexicanus* (Bilimek). a-b. Cuban form: a. Pedipalp tibia, dorsal view. b. Tarsus with second tarsomere shaded in to show transverse line. c-h. Cacahuamilpan form: c. Tarsus with second tarsomere shaded in to show absence of transverse line. d. Gnathopoda, ventral view, showing broad mesal area of white. e. Pedipalp basitarsus, inner lateral view. f. Tibia, dorsal view. g. Tibia, ventral view. h. Femur, ventral view. i. Arizonan form: tibia, ventral view.

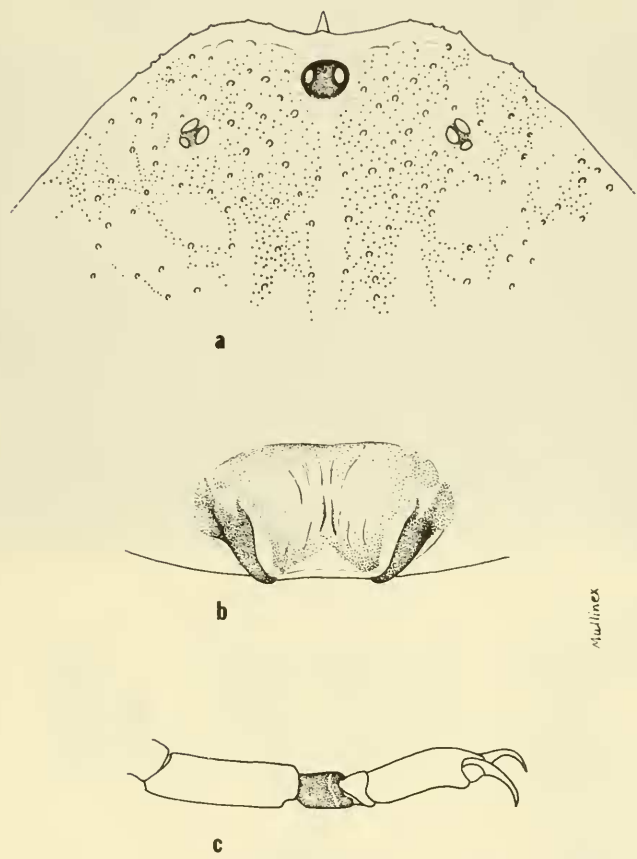


a



b

FIGURE 30. *Paraphrynus pococki* Mullinex. a. Carapace of small median ocular tubercle form. b. Male genitalia of allotype.



MullinEx

FIGURE 31. *Paraphrynus pococki* Mullinex, holotype (female). a. Carapace. b. Female genitalia. c. Tarsus with second tarsomere shaded in to show transverse line.

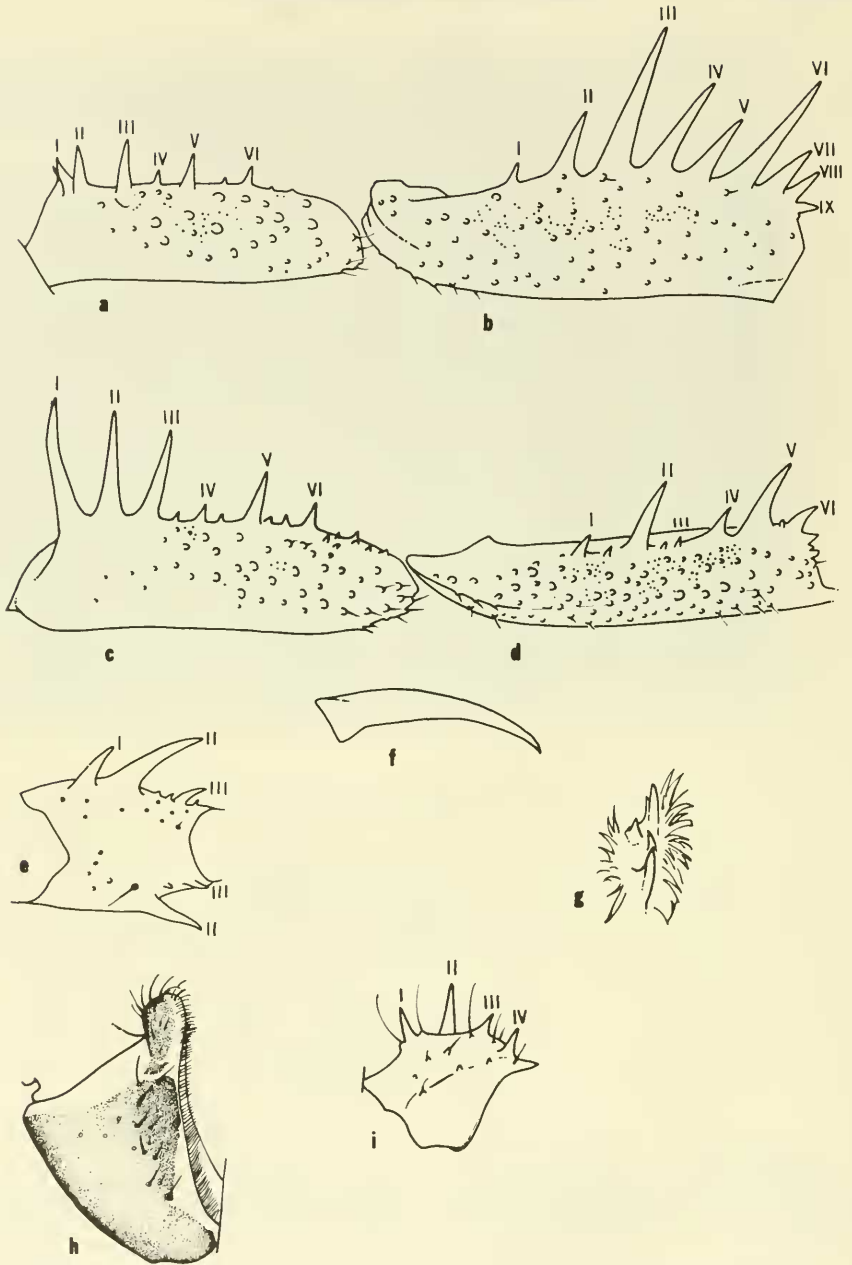
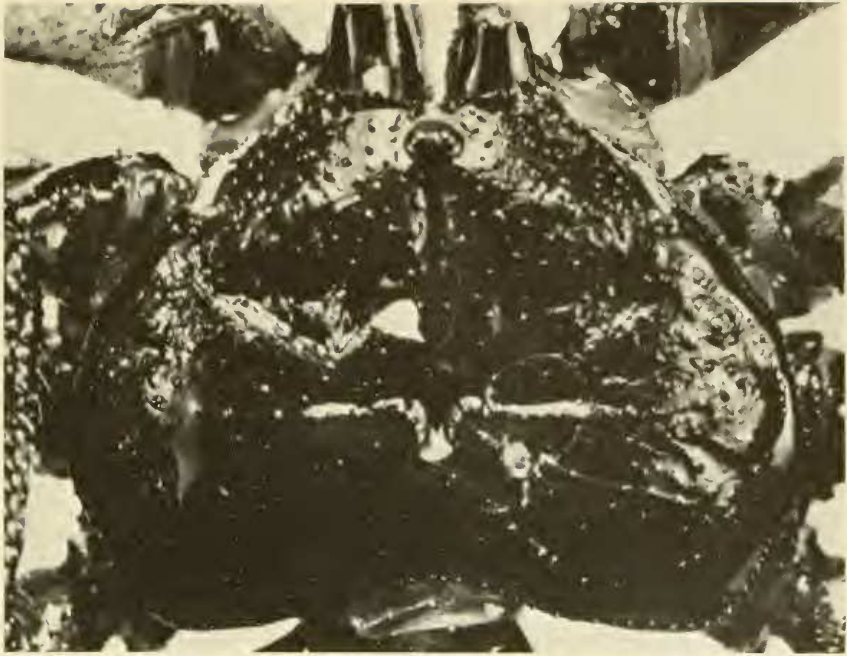
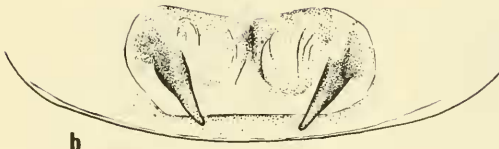


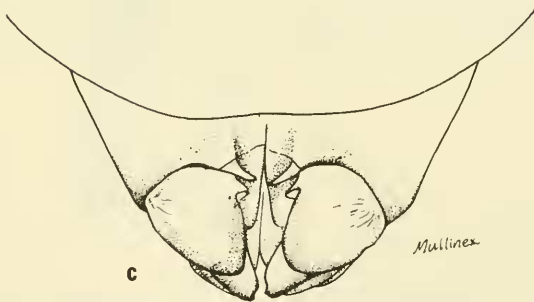
FIGURE 32. *Paraphrynus pococki* Mullinex, holotype (female). a. Pedipalp femur, dorsal view. b. Pedipalp femur, dorsal view. c. Pedipalp femur, ventral view. d. Pedipalp tibia, ventral view. e. Pedipalp basitarsus, inner lateral view. f. Pedipalp tarsus, dorsal view. g. Basal segment of right chelicera, anteroventral view showing one tooth on outer edge. h. Gnathocoxa, ventral view showing region devoid of setae, basal to endite and adjoining white mesal area. i. Pedipalp trochanter, dorso-inner lateral view.



a



b



c

FIGURE 33. *Paraphrynus azteca* (Pocock). a. Carapace of female paratype. b. Female genitalia of specimen from Santa Rosa, Vera Cruz. c. Genitalia of male specimen from Comalcalca.

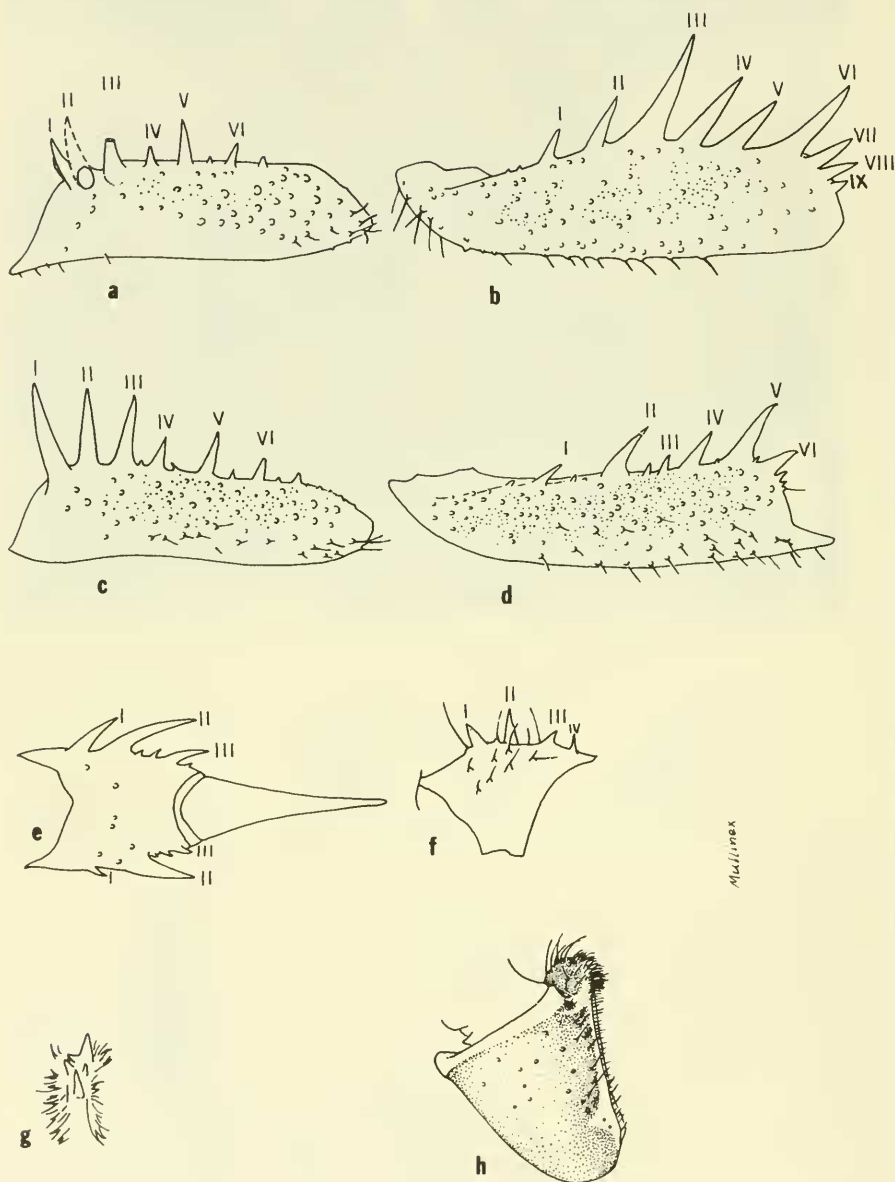


FIGURE 34. *Paraphrynus asteca* (Pocock), female paratype. a. Pedipalp femur, dorsal view. b. Pedipalp tibia, dorsal view. c. Pedipalp femur, ventral view. d. Pedipalp tibia, ventral view. e. Pedipalp basitarsus and tarsus, inner lateral view. f. Pedipalp trochanter, dorso-inner lateral view. g. Basal segment of right chelicera, anteroventral view. h. Gnathocoxa, ventral view, showing narrow mesal area of white.



FIGURE 35. Distribution of *Paraphrynus raptator* (Pocock) (●); *Paraphrynus williamsi* Mullinex (○); *Paraphrynus emaciatus* Mullinex (▲); and *Paraphrynus leptus* Mullinex (△).



FIGURE 36. Distribution of four forms of *Paraphrynus laevifrons* (Pocock); Quezaltepec form (□), Guanacaste form (○), Grutas del Venado form (■), and Panamanian form (●).



FIGURE 37. Distribution of *Paraphrynus astes* Mullinex (Δ); *Paraphrynus viridiceps* (Pocock) (▲); and Cuban form of *Paraphrynus mexicanus* (Bilimek) (■).



FIGURE 38. Distribution of *Paraphrynus velmae* Mullinex (○); and three forms of *Paraphrynus pococki* Mullinex, short spined form (□), long spined form (△), and small median ocular tubercle form (▲).



FIGURE 39. Distribution of two forms of *Paraphrynus azteca* (Pocock), Isthmus form (●) and Atoyac form (○); two forms of *Paraphrynus mexicanus* (Bilimek), Cacahuamilpan form (△) and Arizonan form (▲); *Paraphrynus pocoeki* Mullinex (□), and *Paraphrynus baeops* Mullinex (■).

TABLE 1. Comparison of diagnostic characters of four forms of *Paraphrynus laevifrons* (Pocock).

	Panamanian form	Grutas del Venado form	Guanacaste form	Quezaltepeque form
Number of specimens	11	4	7	2
length of Td-III to width of tibia	1.20-1.77	1.17-1.28	0.93-1.17	1.16-1.33
length of Td-III to length of Td-VI	1.05-1.21	1.02-1.17	0.93-1.0	0.89-0.95
length of Td-II to length of Td-V	1.04-1.74	0.74-0.84	0.80-1.0	0.75-0.83
difference between lengths of Fv-I, II, and III	strongly uneven (fig. 19c)	even (fig. 20a)	even (fig. 20c)	slightly uneven